

Review of the Polish *Deutonura* CASSAGNAU, 1979 (Collembola: Neanuridae: Neanurinae) with redescription of *D. conjuncta* (STACH, 1926)

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Abstract. A critical review of the Polish members of the genus *Deutonura* CASSAGNAU, 1979 is presented. *Deutonura conjuncta* (STACH, 1926) is redescribed in details and its lectotype is designated. Complements to the description of *D. albella* (STACH, 1920), *D. stachi* (GISIN, 1952), *D. weinerae* DEHARVENG, 1982 and *D. plena* (STACH, 1951) are provided, based on types and new extensive material. Data on their occurrence, ecological preferences, variability and on the morphology of their first instar are given. Polish records of *D. phlegrea* (CAROLI, 1912) are questioned.

Key words: Collembola, springtails, Neanurinae, *Deutonura*, taxonomy, Poland.

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I. INTRODUCTION

CASSAGNAU (1979) established the subgenus *Deutonura* as one of four subgenera within the genus *Neanura* MACGILLIWRAY, 1893. Additional, he designated *Achorutes phlegraeus* CAROLI, 1912 from Italy as the type species of the subgenus. Later DEHARVENG (1982a) elevated *Deutonura* to the genus rank. Afterwards CASSAGNAU (1989) classified this taxon to Neanurini, one of six newly created tribes within the subfamily Neanurinae. *Deutonura* is the largest genus in the entire subfamily and currently includes 54 species (ARBEA & JORDANA 1991; DALLAI 1983; DEHARVENG 1982b, 1987; DEHARVENG & WEINER 1984; LUCIÁÑEZ & SIMÓN 1995; TRASER et al. 1993). The majority of *Deutonura* members, 45 species, are known exclusively from the westernmost part of the Palearctic (Europe, North Africa, Caucasus). The remaining 8 species are distributed in the eastern part of the above-mentioned region (Korea, Japan and Far East) and only *Deutonura frigida* (YOSII, 1969) ranges from West Siberia to North-eastern America (BABENKO & FJELLBERG 2006). The genus is related to the monotypic genus *Albanura* DEHARVENG, 1982, due to the fusion of tubercles Di and De on head and of tubercles Di on abdominal tergite V. *albanura*

differs from *Deutonura* by a combination characters: fused tubercles Di on abdominal tergite IV, elementary tubercle DF present on head and 2+2 chaetae Di on abdomen V.

According to the recent checklist of Polish Collembola (SKARŻYŃSKI et al. 2002) five species of the genus are reported from Poland: *Deutonura albella* (STACH, 1920), *D. conjuncta* (STACH, 1926), *D. stachi* (GISIN, 1952), *D. plena* (STACH, 1951) and *D. phlegrea* (CAROLI, 1912). Authors of the mentioned checklist suggested, however, that data of the last species probably concern *D. albella* and should be verified. Recently *D. weinerae* DEHARVENG, 1982 was added to the list (SMOLIS & SKARŻYŃSKI 2003). During intensive field studies (years 1999-2003) in Poland, a rich material of the above species (except *D. phlegrea*) was found. A detailed examination of collected specimens, additional material (from Czech Republic, Hungary, Ukraine and Slovakia) and types, thanks to the kindness of Wanda M. WEINER from Institute of Systematics and Evolution of Animals PAS Cracow, convinced me that *D. conjuncta* should be redescribed and the other species needed additions to existing descriptions. The present paper contains, in addition to species descriptions, notes on their variability, geographical distribution, ecological preferences and morphology of the first instar.

II. TERMINOLOGY

The terminology and layout of the tables used in this paper follow DEHARVENG (1983), DEHARVENG & WEINER (1984), GREENSLADE & DEHARVENG (1990) and SMOLIS (in press).

Abbreviations used:

General morphology: abd. – abdomen, ant. – antenna, AOIII – sensory organ of antennal segment III, Cx – coxa, Fe – femur, Scx2 – subcoxa 2, T – tibiotarsus, th. – thorax, Tr – trochanter, VT – ventral tube.

Groups of chaetae: Ag – antegenital, An – anal lobes, ap – apicales, ca – centroapicales, cm – centromediales, cp – centroposteriores, d – dorsal, Fu – furcal, vc – ventrocentral, Ve or ve – ventroexternal, Vea – ventroexternoanteriores, Vem – ventroexternomediales, Vep – ventroexteroposteriores, Vel – ventroexternolaterales, Vec – ventroexternocentrales, Vei – ventroexternointernales, Vi or vi – ventrointernal, Vl – ventrolateral.

Tubercles: Af – antenno – frontal, Cl – clypeal, De – dorsoexternal, Di – dorsointernal, Dl – dorso-lateral, L – lateral, Oc – ocular, So – subocular.

Types of chaetae: Ml – long macrochaeta, Mc – short macrochaeta, Mcc – very short macrochaeta, me – mesochaeta, mi – microchaeta, ms – s-microchaeta, S or s – chaeta sensuality or sensillum, bs – sensilla on ant. IV, miA – microchaetae on ant. IV, iv – ventral ordinary chaetae on ant. IV, or – organite of ant. IV, brs – border sensilla on ant. IV, i – ordinary chaeta on ant. IV, mou – cylindrical sensilla on ant. IV („soies mousses”), x – labial papilla x, L' – ordinary chaeta on abd. V.

III. SYSTEMATIC PART

Deutonura conjuncta (STACH, 1926)

Figs 1-19, Tab. 1

Achorutes conjunctus STACH, 1926: 3

Lathriopyga conjuncta: STACH 1951: 73

Type material. Lectotype juvenile on slide by present designation, Poland, West Carpathians, originally labelled “Tatry 1909-1936”, leg. J. STACH, det. J. STACH (collection of the Institute of Systematics and Evolution of Animals, Polish Academy of Sciences, Cracow, Poland).

Other material. (Abbreviations used: P – Poland, WCa – Western Carpathians, ECa – Eastern Carpathians, WS – Western Sudetes, ES – Eastern Sudetes, N. P. – National Park). 2 juveniles on slide, P, WCa, Pieniny Mts., Pieniński N. P., S slope of Facimiech Mt., 600 m alt., fir forest, n rotting wood, 1.V.1999, leg. A. SMOLIS; female and juvenile on slides, same data as lectotype; numerous specimens on slides, P, WCa, Tatra Mts., Tatrzański N. P., Tomanowa valley, 1500 m alt., herb vegetation in dwarf-pine shrubs, soil under stones, 13.VI.2000, 1.VI.2001, 10.VII.2001, leg. A. SMOLIS, D. SKARŻYŃSKI; numerous specimens on slides, P, WCa, Tatra Mts., Tatrzański N. P., N slope of Gładkie Uplazińskie summit, 1600 m alt., herb vegetation in dwarf-pine shrubs, soil under stones, 10.VII.2001, leg. D. SKARŻYŃSKI; numerous specimens on slides, P, WCa, Tatra Mts., Tatrzański N. P., Kościeliska valley, near entrance to cave Mylna, 1200 m alt., Norway spruce forest (subalpine belt), litter, 14.VI.2000, leg. A. SMOLIS, D. SKARŻYŃSKI; numerous specimens on slides, P, WCa, Beskid Żywiecki Mts., Babiogórski N. P., N slope of Babia Góra, 1000-1250 m alt., Norway spruce forest (subalpine belt), fir-spruce forest and Carpathian beech forest (montane belt), decaying wood, mosses and lichens on branches, 3-4.VI.1999, leg. A. SMOLIS; female and male on slides, P, Wyżyna Krakowsko-Wieluńska (upland), Góry Bydlińskie, old pine forest, 21.X.1988, leg. A. SZEPTYCKI, det. W. M. WEINER male on slide, P, Wyżyna Małopolska (upland), Młodzawy near Pińczów, Nida valley, alder forest, litter, soil and mosses, 3.IV.1991, leg. A. SZEPTYCKI (collection of the Institute of Systematics and Evolution of Animals, Polish Academy of Sciences, Cracow, Poland); female on slide, P, Middle Sudetes, Masyw Ślęży (range), near Sulistrowiczki village, wet meadow, 14.IV.1989, leg. R. J. POMORSKI, det. R. J. POMORSKI; 2 females on slide, P, Middle Sudetes, Pogórze Wałbrzyskie (highlands), nature reserve “Wąwóz Pełcznicy pod Książem”, mixed forest, litter, 7.II.1990, leg. D. SKARŻYŃSKI; male on slide, P, Middle Sudetes, Bystrzyckie Mts., nature reserve “Torfowisko pod Zieleńcem”, 750 m alt., marshy spruce forest, litter, 5.XI.1999, leg. D. SKARŻYŃSKI, A. SMOLIS; female and male on slide, P, East Sudetes, Opawskie Mts., near Głucholazy village, mixed forest, 10.XI.1989, leg. D. SKARŻYŃSKI, det. D. SKARŻYŃSKI; female on slide, P, East Sudetes, Śnieżnik range, near Kletno village, spruce forest, litter, 20.V.1992, leg. D. SKARŻYŃSKI, det. R. J. POMORSKI, D. SKARŻYŃSKI; male on slide, P, East Sudetes, Śnieżnik range, Wapniarka Mt., 518 m alt., old adit, birch shrubs, under bark of rotting logs and in decaying wood, 29.III.1999, leg. A. SMOLIS; juvenile on slide, P, West Sudetes, Karkonosze Mts., near Szklarska Poręba, valley of Czarna Płuczka stream, 600 m alt., litter, 12.XI.1999, leg. D. SKARŻYŃSKI; 3 females, male and 6 juveniles, P, West Sudetes, Kotlina Jeleniogórska (basin), Trzczańskie Mokradła, pine forest on peat bog, 1.V.2001, leg. D. SKARŻYŃSKI; 2 males on slide, P, West Sudetes, Pogórze kaczawskie (highland), near Złotoryja, S slope of Wilkołak, 300 m alt., mosse on rocks, 15.V.1985 leg. R. J. POMORSKI, det. R. J. POMORSKI; male on slide, P, Nizina Wielkopolsko-Kujawska (lowland), near Torzym, pine forest, litter and mosses, 25.VIII.2000, leg. D. SKARŻYŃSKI; male on slide, P, Wzgórza Trzebnickie (hills), nature reserve “Pieczyńska”, alder forest, litter and mosses, 11.IV.2001, leg. A. SMOLIS; 3 female and 3 males on slides, P, Wzgórza Trzebnickie (hills), near Ludgierzowice village, pine forest, litter and mosses, 15.IV.2001, 21.IV.2001; juvenile on slide, Czech Republic, East Sudetes, Wysokie Jesioniki range, nature reserve “Bila Opawa”, 1000 m alt., Norway spruce forest, mosses, 21.X.2000 leg. A. SMOLIS; juvenile on slide, Slovakia, WCa, Slovak Karst Ardo, oak forest *Corneto-Quercetum acerosum*, mosse on rock, 13.VI.1997, leg. L. KOVÁČ, det. L. KOVÁČ. If not otherwise stated, other material is housed in the Department of Biodiversity and Evolutionary Taxonomy of Wrocław University, Poland.

Diagnosis. Habitus typical of the genus *Deutonura*. Dorsal tubercles well developed. 2+2 dark pigmented eyes. Buccal cone elongated. Labral chaetotaxy 0/2, 2. Mandible thin with 3 teeth. Head with 3 chaetae Oc, chaetae A, B, C, D, E present, chaeta O absent. Tubercles Af and Cl on

head fused. Tubercle (Af+Cl) without non-reticulate area. Tubercles Dl and (L+So) on head with 6 and 10 chaetae respectively. Tubercles De on thoracic terga II and III with 4 chaetae. Tubercles L on abd. III and IV with 4 and 9-11 chaetae respectively. Cryptopygy strongly developed. Claw without inner tooth.

Redescription. Habitus typical of the genus. Body length (without antennae): females 2.5-3.4 mm, males 2.4-2.9 mm, I instars 1.0-1.6 mm. Colour of the body dark blue. 2+2 large, dark pigmented eyes (Fig. 11).

Types of dorsal ordinary chaetae. Macrochaetae Ml relatively long, thickened, almost cylindrical, arc-like, narrowly sheathed, apically rounded or rarely pointed (Figs 1, 7-8, 11-12, 16); macrochaetae Mc and Mcc thin, apically rounded or pointed; mesochaetae and microchaetae short, thin and pointed. Macrochaetae in I instars very long, rapidly tapered, thin, arc-like or straight, narrowly sheathed, apically pointed (Figs 4-6). All macrochaetae serrated. Same number and arrangement of chaetae in adults nad I instars, except chaetotaxy of ant. IV (see Tab. 1c) and genital plate (complete absence of chaetae in first instars).

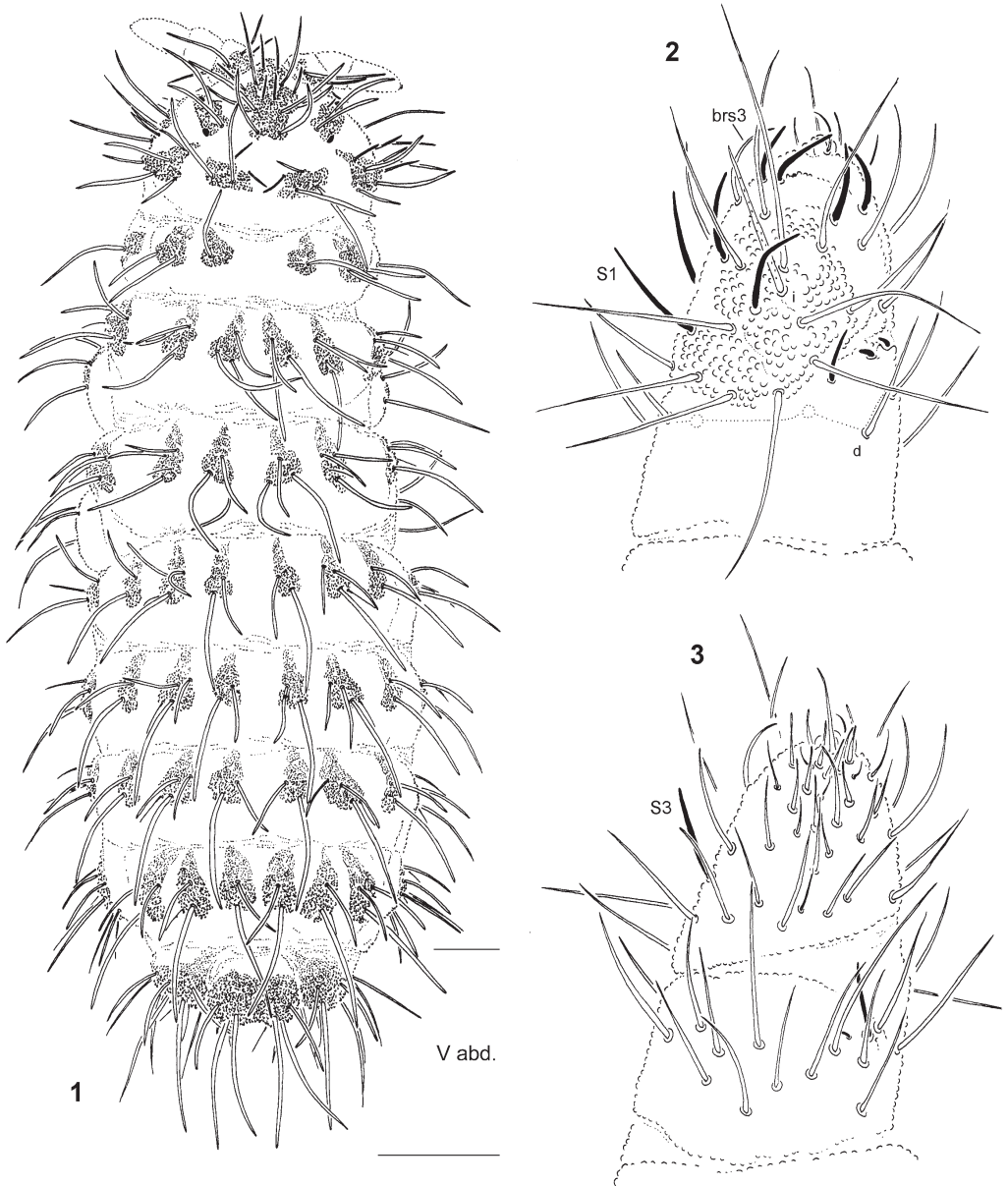
Head. Buccal cone elongated (Figs 9-10). Labrum pointed, with ventral sclerifications ogival as in Figs 9, 14. Labrum chaetotaxy 0/2, 2 (Fig. 15). Chaetotaxy of labium as in Fig. 9. Maxilla styli-form, mandible thin and tridentate. Chaetotaxy of antennae in adults and I instars as in Tab. 1c and in Figs 2-3. Apical vesicle distinct, trilobate. Sensilla S on ant. IV rather long and very thin. Group d on ant. III with 3 chaetae (Fig. 2). Chaetotaxy of head as in Tab. 1a and b, and Figs 8-11. Tubercles Cl and Af fused (Fig. 11). Non-reticulate area on tubercle (Af+Cl) absent. Chaeta O absent. Tubercle Dl with 6 chaetae, chaeta Di3 present (Fig. 8). Tubercle (L+So) with 10 chaetae, chaeta So5 free (Fig. 10). Chaetae So2 as Mcc or mi. Chaeta Vep4 within tubercle (L+So). Chaeta A shorter than B.

Thorax, abdomen, legs. Body sensilla fine and smooth, distinctly shorter than nearby macrochaetae (Figs 12, 16). Chaetotaxy of th. and abd. as in Tab. 1d and in Figs 1, 4-7, 12-13, 16-19. Tubercles De on th. II with 4 chaetae. Chaetae De3 on abd. I-III slightly shorter than De2. Chaetae Di2 and Di3 as Ml (Figs 6-7). Furca rudimentary with 4 very small microchaetae (Fig. 18). Tubercle L on abd. IV with 9-11 chaetae (Figs 17, 19). Chaeta L' on abd. V present (Fig. 17). Reticulation on anal lobes present. Cryptopygy present, strongly developed (Fig. 13). Abd. VI invisible from dorsal side. Chaetotaxy of legs as in Tab. 1d. Femora I, II, III with 13, 13, 11 chaetae respectively. Claw without inner tooth.

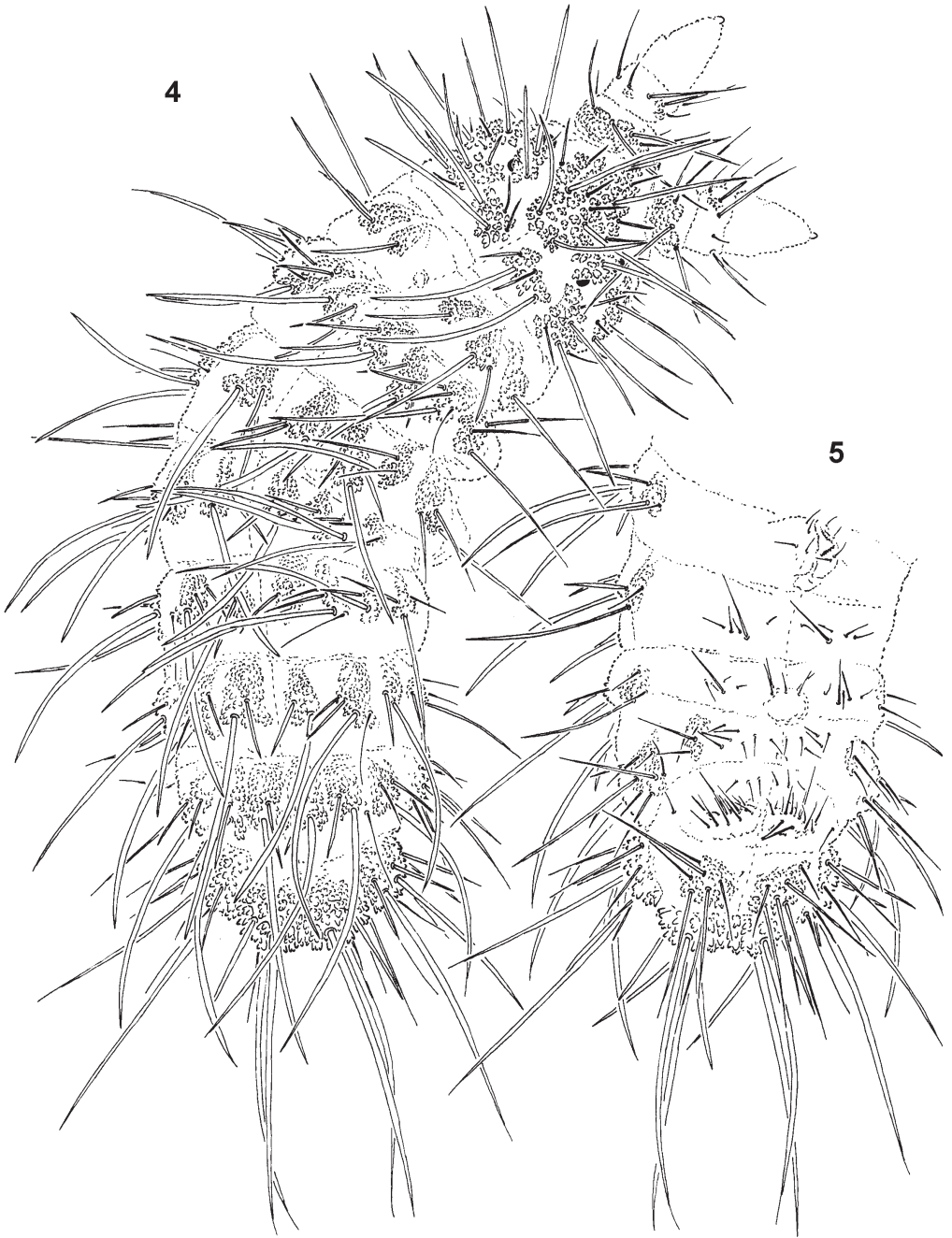
Discussion. *Deutonura conjuncta* belongs to the *conjuncta* group (DEHARVENG 1979) characterised by the fusion of tubercles Af and Cl on head, absence of non-reticulate area within tubercle (Af+Cl) and presence of very strong cryptopygy. In the chaetotaxy it closely resembles *D. provincialis* DEHARVENG, 1979 from France, but differs clearly in the number of chaetae Di on abd. V (3+3 in *conjuncta*, 4+4 in *provincialis*).

Distribution. An European species, reported from mountains and uplands in the central and southern part of the continent. In Poland, where the species distribution is the best known, recorded from the Western Carpathians (Tatra Mts., Kotlina Nowotarska (basin), STACH 1951, 1964; Pieniny Mts., WEINER 1981; Beskid Żywiecki Mts., SKARŻYŃSKI & SMOLIS 2006), the Sudetes (SKARŻYŃSKI 2003), Wyżyna Krakowsko-Wieluńska (upland) (STACH 1964; SZEPTYCKI 1967), Wyżyna Śląska (upland) (STACH, 1964), Wzgórza Trzebnickie (hills) and Nizina Wielkopolsko-Kujawska (lowland) (localities from last two regions, see material).

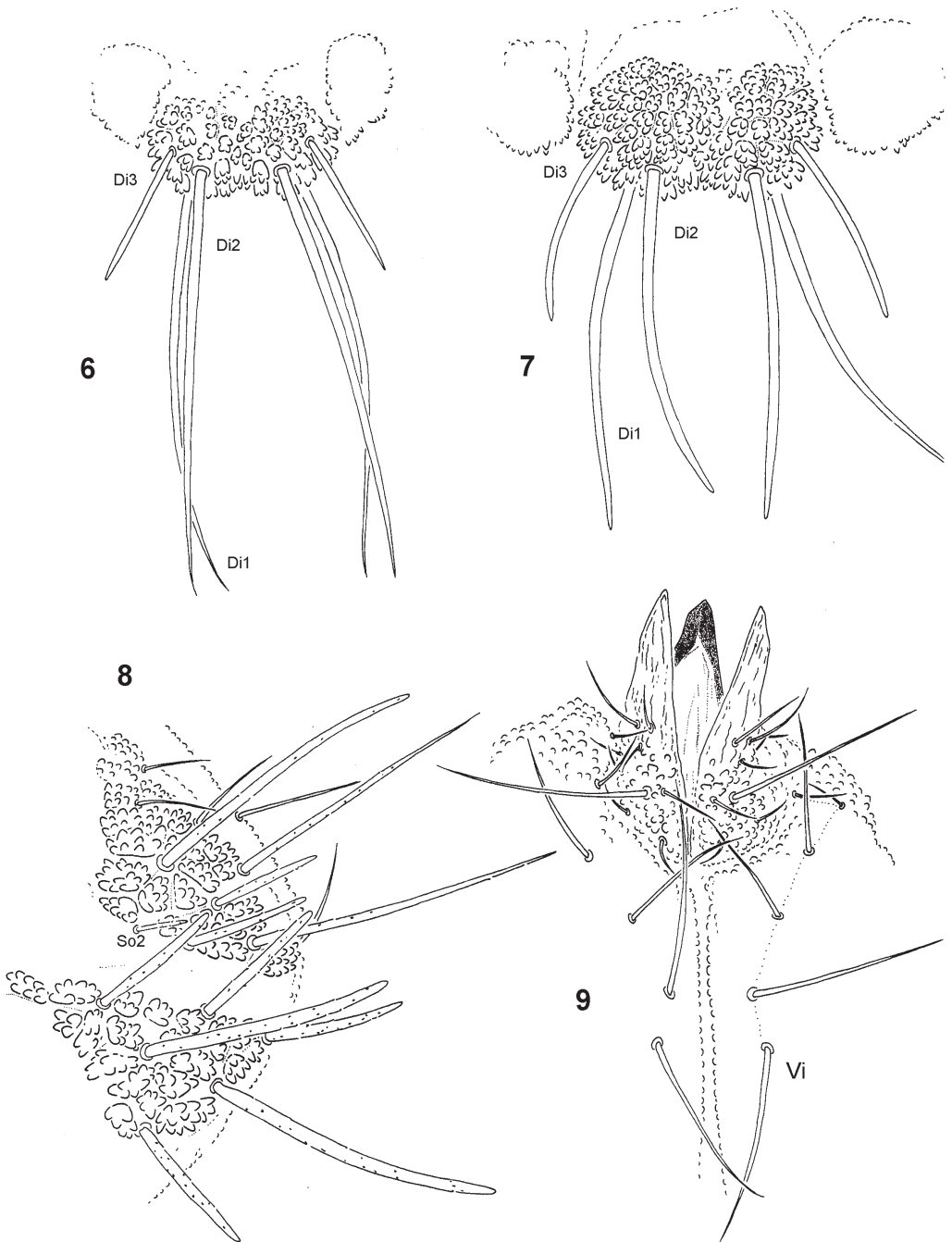
Ecological remarks. A woodland species, occurring in forests of a much varied humidity: from dry lowland pine woods to humid mountain beech and spruce forests or even marschy alder stands. In the Carpathians numerous specimens were found in dwarf mountain-pine shrubs and herb vegetation (subalpine belt). It was also collected in German caves (SCHULZ 1994; ECKERT & PALISSA 1999). It inhabits mainly forest litter, soil under stones, moss tufts, sometimes under the bark of fallen trees and in rotting wood. First instars have been collected in February, May, June and October.



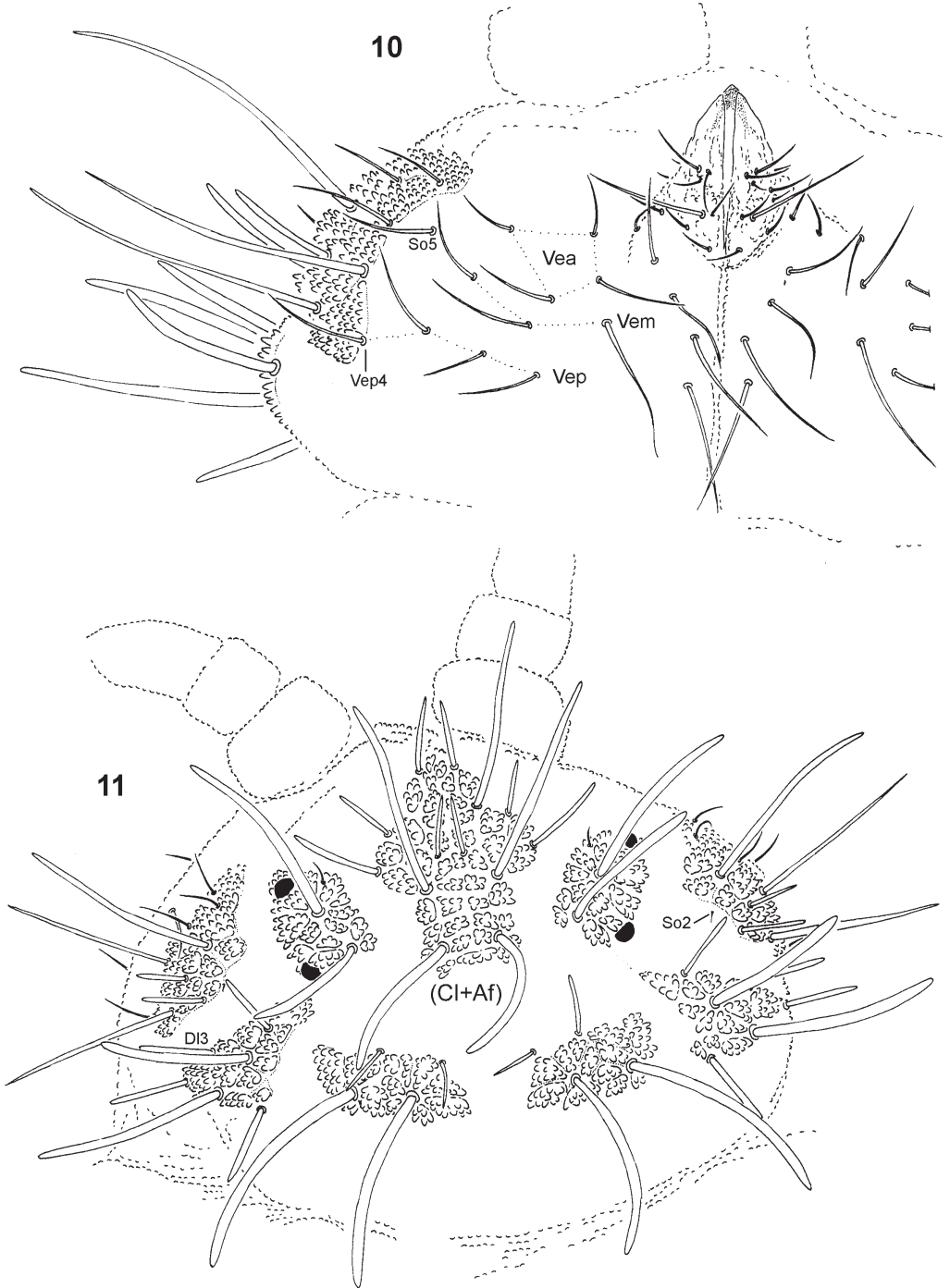
Figs 1-3. *Deutonura conjuncta* (STACH, 1926): 1 – chaetotaxy and distribution of tubercles, adult (dorsal view); 2 – dorsal chaetotaxy of ant. III-IV, adult; 3 – ventral chaetotaxy of ant. III-IV, adult.



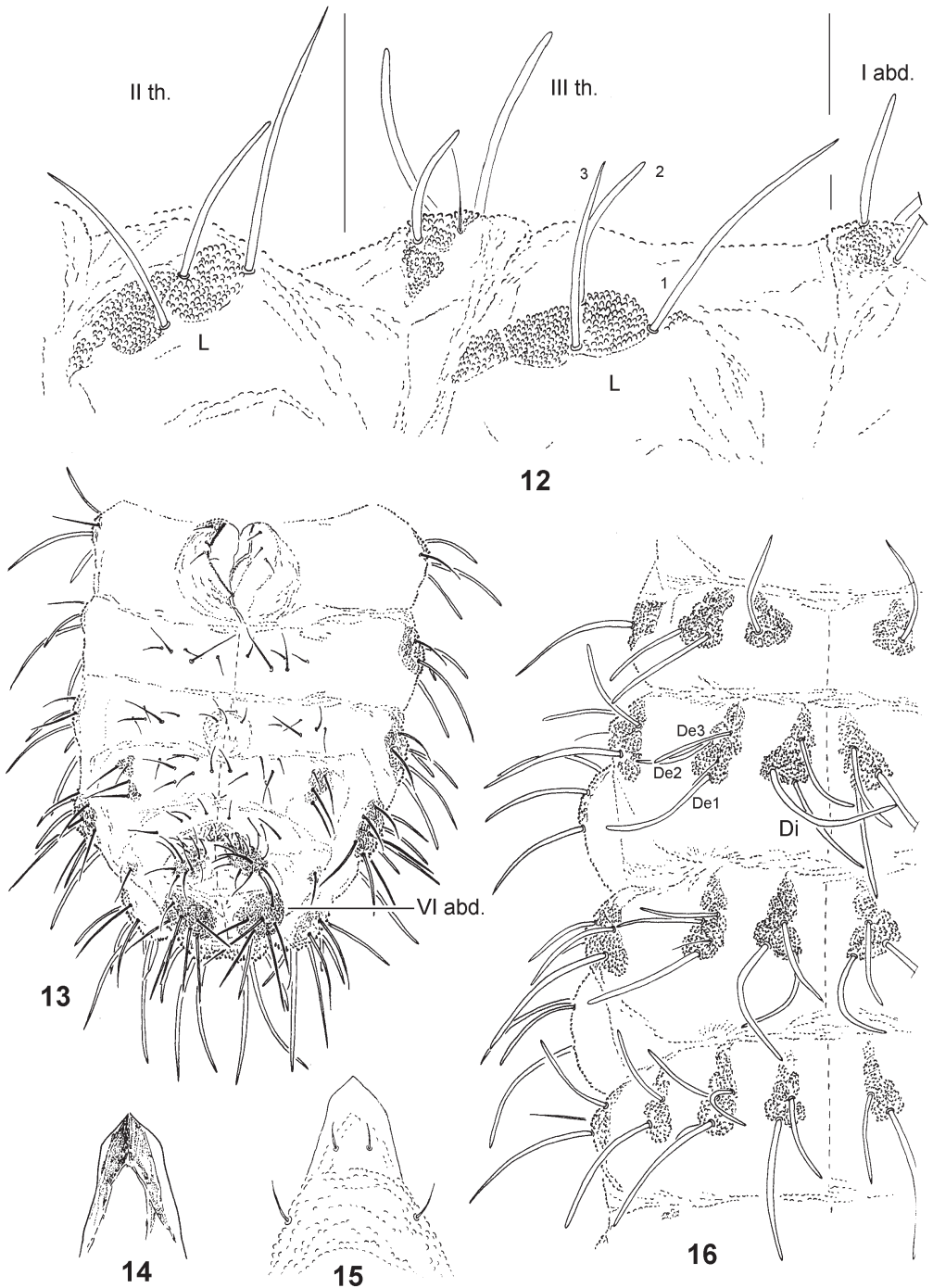
Figs 4-5. *Deutonura conjuncta* (STACH, 1926): 4 – chaetotaxy and distribution of tubercles, first instar (dorsal view); 5 – ventral chaetotaxy of abdomen, first instar.



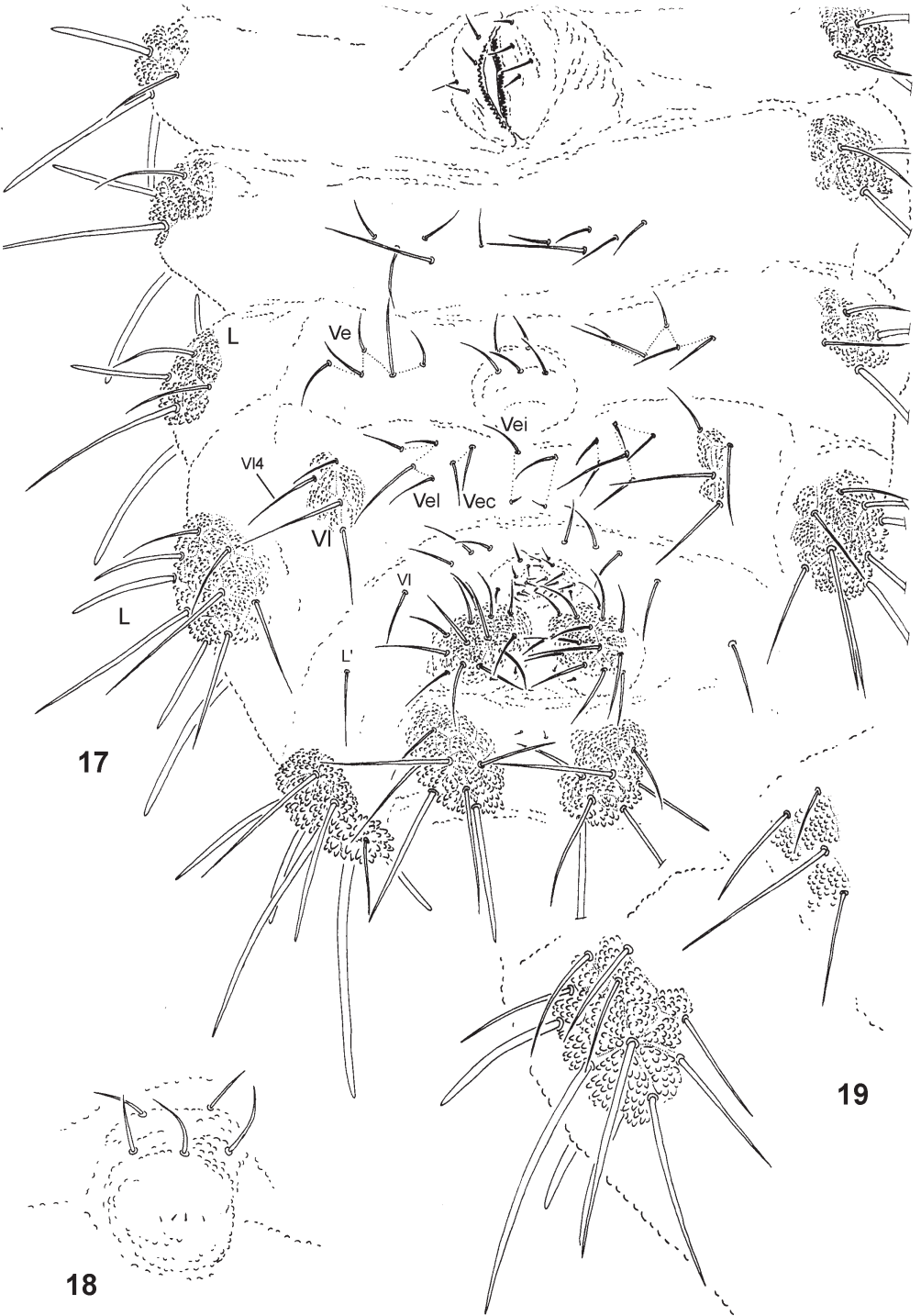
Figs 6-9. *Deutonura conjuncta* (STACH, 1926): 6 – tubercle (Di+Di) of abd. V, first instar; 7 – tubercle (Di+Di) of abd. V, adult; 8 – tubercles D1 and (L+So) on head; 9 – chaetotaxy of labium and group Vi.



Figs 10-11. *Deutonura conjuncta* (STACH, 1926): 10 – chaetotaxy of head (ventral view); 11 – chaetotaxy of head (dorso-lateral view).



Figs 12-16. *Deutonura conjuncta* (STACH, 1926): 12 – chaetotaxy of th. II-III and abd. I (lateral view); 13 – abdomen, adult (ventral view); 14 – ventral sclerifications of labrum; 15 – labrum; 16 – dorsal chaetotaxy of th. and abd. I.



Figs 17-19. *Deutonura conjuncta* (STACH, 1926): 17 – chaetotaxy of abd. (ventral view); 18 – furca rudimentary; 19 – chaetotaxy of groups L and VI of abd. IV.

Table 1

Chaetotaxy of *Deutonura conjuncta* (STACH, 1926):

a) Cephalic chaetaotaxy-dorsal side.

Tubercle	Number of chaetae	Types of chaetae	Names of chaetae
(Cl+Af)	14	Ml Mc	A, B, F C, E, G, D
Oc	3	Ml mi	Ocm, Ocp Oca
(Di+De)	4	Ml Mc Mc or Mcc	Di1, De1 De2 Di2
Dl	6	Ml Mc	Di5, Di1 Di2, Di3, Di4, Di6
(L+So)	10	Ml Mc or Mcc Mcc or mi me	L1, L4, So1 L2, L3 So2 So3, So4, So6, So5

b) Cephalic chaetaotaxy-ventral side.

Group	Number of chaetae
Vi	6
Vea	4
Vem	3
Vep	4
labium	11, 0x

c) chaetotaxy of antennae.

Segment, Group	Number of chaetae	Segment, Group	Number of chaetae	
I	7	IV	Adult	I instar
II	12		or, 8 S, i, 12 mou, 6 brs, 2 iv	or, 2 S, i, 6 mou, 1 brs, 2 iv
III	5 sensilla AO III			
ve	5	ap	8 bs, 5 miA	8 bs, 5 miA
vc	4	ca	2 bs, 3 miA	2 bs, 3 miA
vi	4	cm	3 bs, 1 miA	3 bs, 1 miA
d	3	cp	8 miA, 1 brs	8 miA

d) Postcephalic chaetotaxy.

Terga					Legs				
	Di	De	Dl	L	Scx2	Cx	Tr	Fe	T
th. I	1	2	1	-	0	3	6	13	19
th. II	3	3+s	3+s+ms	3	2	7	6	13	19
th. III	3	3+s	3+s	3	2	8	6	11	18
					Sterna				
abd. I	2	3+s	2	3	TV: 4				
abd. II	2	3+s	2	3	Ve: 5 Ve1 - present				
abd. III	2	3+s	2	4	Vel: 5			Fu: 5 me 4	mi
abd. IV	2	2+s	3	9-11	Vel: 4	Vec: 2	Vei: 2	VI: 4	
abd. V	(3+3)	7+s			Ag: 3			VI: 1	L': 1
abd. VI	7				Ve: 13-14			An:2mi	

Deutonura albella (STACH, 1920)

Figs 20-39, Tab. 2, 3

Achorutes phlegraeus albella STACH, 1920: 144*Lathriopga phlegraea* ab. *albella*: STACH 1951: 81*Deutonura albella*: DEHARVENG 1982a: 3

Type material. Lectotype female on slide, Poland, West Carpathians, Kotlina Nowotarska (basin), Czarny Dunajec village, 1920, leg. J. STACH, det. L. DEHARVENG (collection of the Institute of Systematics and Evolution of Animals, Polish Academy of Sciences, Cracow, Poland).

Other material. (Abbreviations used: P – Poland; WCa – Western Carpathians; ECa – Eastern Carpathians; WS – Western Sudetes; ES – Eastern Sudetes; N. P. – National Park; ISEZ – collection of Institute of Systematics and Evolution of Animals, Polish Academy of Sciences, Cracow, Poland). 2 females on slide, P, WCa, Tatra Mts., “Chłąbówki”, 19.VII.1918, leg. J. STACH, det. L. DEHARVENG (ISEZ); numerous specimens on slides, P, WCa, Kotlina Nowotarska (basin), Czarny Dunajec village, 1919-1920, leg. J. STACH, det. L. DEHARVENG (ISEZ); 2 males and 2 juveniles on slides, P, WCa, Tatra Mts., “Suchy Żlebek”, 27.VII.1932, leg. J. STACH, det. L. DEHARVENG (ISEZ); 4 specimens, P, WCa, Pieniny Mts., “Krościenko”, 4.VII.1934, leg. J. STACH, det. L. DEHARVENG (ISEZ); female on slide, P, WCa, Pieniny Mts., Pieniński N. P., NE slope of Białe Skaly, 720 m alt., under bark of tree, 25.IX.1976, leg. W. M. WEINER, det. L. DEHARVENG (ISEZ); 2 females on slide, P, WCa, Pieniny Mts., Pieniński N. P., S slope of Facimiech, 640 m alt., fir forest *Carici-Fagetum abietosum*, under bark of tree, 28.VIII.1976, leg. W. M. WEINER, det. L. DEHARVENG (ISEZ); female, male and juvenile on slide, P, WCa, Pieniny Mts., Pieniński N. P., S slope of Szopka, 600 m alt., Carpathian beech forest *Fagetum carpaticum typicum*, on roots of fallen spruce, 15.I.1977, leg. W. M. WEINER, det. L. DEHARVENG (ISEZ); female on slide, P, WCa, Pieniny Mts., Pieniński N. P., Trzy Korony Mt., under bark of decomposed log, 11.VI.1982, leg. J. K. MŁYNARSKI, det. W. M. WEINER (ISEZ); numerous specimens on slides, P, WCa, Pieniny Mts., Pieniński N. P., valleys of Pieniński and Huliński stream, 600 m alt., Carpathian beech forest, under bark of rotting logs, in decaying wood and litter, 30.IV, 2.V.1999, leg. A. SMOLIS; numerous specimens on slides, P, WCa, Beskid Żywiecki Mts., Babiogórski N. P., N slope of Babia Mt., 1000-1250 m alt., Norway spruce forest (subalpine belt), fir-spruce forest and Carpathian beech forest (montane belt), decaying wood, litter, 3-4.VI.1999, leg. A. SMOLIS; female on slide, P, WCa, Beskid Śląski Mts., near Ustroń, NE slope of Wielka Czantoria Mt., valley of Suchy stream, 650 m alt., Carpathian beech forest, in decaying wood, 16.IV.2001, leg. A. SMOLIS; numerous specimens on slides, P, WCa, Beskid Sądecki Mts., near Muszyna village, nature reserve “Las lipowy Obrożyska”, W slope of Mikowa Mt., 500-600 m alt., oak-hornbeam and beech-fir forest, under bark of decomposed log and in rotting wood, 26-28.IV.1999, leg. A. SMOLIS; 3 females, 3 males and juvenile on slides, P, WCa, Beskid Sądecki Mts., nature reserve “Łabowiec”, 800 m alt., Carpathian beech forest, in decaying wood, 3.V.2000, leg. A. SMOLIS; 3 females, 3 males on slides, P, WCa, Beskid Sądecki Mts., nature reserve “Uhryń”, 800 m alt., beech-fir forest, in decaying wood, litter, 13.V.2001, leg. A. SMOLIS, D. SKARŻYŃSKI; numerous individuals on slides, P, WCa, Beskid Niski Mts., near Tylawa village, nature reserve “Przełom Jasiołki”, N slope of Ostra Mt., 400-600 m alt., sycamore forest, Carpathian beech forest, oak-hornbeam and Carpathian alder forest, under bark of rotting logs, decaying wood, soil, mosses and litter, 5.V.2000, 28.X.2000, 12.V.2001, 16.VI.2001, leg. A. SMOLIS, D. SKARŻYŃSKI; numerous specimens on slides, P, WCa, Beskid Niski Mts., nature reserve “Kornuty”, 700 m alt., Carpathian beech forest, decaying wood, 15.VI.2001, leg. A. SMOLIS; male on slide, P, WCa, Beskid Niski Mts., Magurski N. P., near Huta Polańska village, valley of Zimna Woda stream, 500 m alt., Carpathian beech forest, decaying wood, 14.VI.2001, leg. A. SMOLIS; juvenile on slide, P, Eca, Bieszczady Niskie Mts., near Sanok, fir forest, under bark of rotting log, 12.VII.1987, leg. D. SKARŻYŃSKI; numerous specimens on slides, P, Eca, Bieszczady Wysokie Mts., near Komańcza village, nature reserve “Przełom Osławy pod Duszatynem”, NE slope of Karnaflów Mt., 500-600 m alt., Carpathian beech-fir forest, under

bark of rotting logs, decaying wood and litter, 30.IV-2.V.2001, leg. A. SMOLIS; numerous specimens on slides, P, Eca, Bieszczady Wysokie Mts., near Duszatyn village, nature reserve "Przełom OsFigs 22-24. *Deutonura albella* (STACH, 1920): 22 – chaetotaxy and distribution of tubercles on abdomen, first instar (ventral view); 23 – chaetotaxy and distribution of tubercles on abdomen, adult (ventral view); 24 – chaetotaxy of abd. II-VI (ventral view). "ławy pod Duszatynem", valley of Oslawa river, 450 m alt., Carpathian alder forest, in decaying wood, 2.V.2001, leg. A. SMOLIS; numerous individuals on slides, P, Eca, Bieszczady Wysokie Mts., Bieszczadzki N. P., N slopes of Mała Rawka Mt. and Krzemień Mt., 1000 m alt., Carpathian beech and beech-fir forest, decaying wood and litter, 19.V. 2000, leg. A. SMOLIS; female on slide, P, Wyżyna Krakowsko-Wieluńska (upland), Ojców N. P., Jamki Gorge, *Corylo-Peucedanetum*, 10.VIII.1987, leg. A. SZEPTYCKI, det. W. M. WEINER (ISEZ); male and 2 juveniles on slides, P, Wyżyna Krakowsko-Wieluńska (upland), Jaroszwiec near OlkuFigs 25-27. *Deutonura albella* (STACH, 1920): 25 – tubercle (Di+Di) of abd. V, adult; 26 – tubercle (Di+Di) of abd. V, first instar; 27 – dorsal chaetotaxy of th. and abd. I.sz, nature reserve "Pazurek", beech forest *Fagetum sudeticum*, 11.VIII.1987, leg. A. SZEPTYCKI, det. W. M. WEINER (ISEZ); male and juvenile on slide, P, Wyżyna Krakowsko-Wieluńska (upland), Pomorzany near Olkusz, rocks, 12.VIII.1987, leg. A. SZEPTYCKI, det. W. M. WEINER; 2 juveniles on slide, P, Wyżyna Krakowsko-Wieluńska (upland), nature reserve "Sokole Góry" near Olsztyn, beech forest, 11.IX.1987, leg. A. SZEPTYCKI, det. W. M. WEINER (ISEZ); female and 2 males on slide, P, Wyżyna Małopolska upland, near Orłowiny village, 18.VII.1934, leg. E. Panow, det. L. DEHARVENG (ISEZ); 2 females and male on slide, P, Wyżyna Małopolska upland, near Zalesie Golczowickie village, stare buki, 21.X.1988, leg. A. SZEPTYCKI, det. W. M. WEINER; female on slide, P, Wyżyna Małopolska (upland), Michałów near Busko-Zdrój, nature reserve "Polana Polichno", oak forest, thick litter, 6.VI.1991, leg. A. SZEPTYCKI (ISEZ); male on slide, P, Wyżyna Małopolska (upland), Młodzawy near Pińczów, Nida valley, alder forest, litter, soil and mosses, 3.IV.1991, leg. A. SZEPTYCKI (ISEZ); juvenile on slide, P, Wyżyna Małopolska (upland), Świętokrzyskie Mts., Świętokrzyski N. P., top of Święty Krzyż Mt., 531 m alt., stony field, 28.VII.1995, leg. R. J. POMORSKI; 2 female, male and 7 juveniles on slides, P, Wyżyna Małopolska (upland), nature reserve "Skorocice", near Busko-Zdrój, willow shrubs, decaying wood, 7.X.2000, leg. R. J. POMORSKI, D. SKARŻYŃSKI; numerous specimens on slides, P, Roztocze (upland), Roztoczański N. P., Bukowa Góra, beech and fir forest, litter, decaying wood, 7.X.2000, leg. A. SMOLIS; female and juvenile on slide, P, Middle Sudetes, Pogórze Wałbrzyskie (highlands), nature reserve "Wąwóz Pełcnicy pod Książem", mixed forest, litter, 7.II.1990, leg. D. SKARŻYŃSKI; 3 females and juvenile on slide, P, East Sudetes, Śnieżnik range, Kletno village, beech forest, litter, 14.IV.1991, leg. M. Pakiet; 2 females and male on slide, P, East Sudetes, Złote Mts., Złoty Jar near Złoty Stok, adit, 20.IV.1997, leg. R. J. POMORSKI, det. R. J. POMORSKI, D. SKARŻYŃSKI; numerous specimens on slides, P, East Sudetes, Śnieżnik range, Wapniarka Mt., 518 m alt., old adit, birch shrubs, under bark of rotting logs and in decaying wood, 29.IX, 1.IV, 17.IV, 5.XI.1999, leg. A. SMOLIS, D. SKARŻYŃSKI; juvenile on slide, P, Middle Sudetes, Bystrzyckie Mts., near entrance of Solna Jama cave, 600 m alt., beech forest, decaying wood, 9.VI.1999, leg. A. SMOLIS, D. SKARŻYŃSKI; 3 females and male on slide, P, West Sudetes, Karkonosze Mts., near Szklarska Poręba, valley of Kamienna river, 500 m alt., mixed forest, under bark of decomposed log and in rotting wood, 12.XI.1999, leg. A. SMOLIS, D. SKARŻYŃSKI; 2 females and male on slide, P, West Sudetes, Kaczawskie Mts., Miłek Mt., 500 m alt., beech forest, decaying wood and under bark of rotting logs, 28.V.2000, leg. R. J. POMORSKI; numerous specimens on slides, P, Nizina Wielkopolsko-Kujawska (lowland), near Łagów, W bank of Ciecz Lake, beech forest, decaying wood, under bark of rotting logs, 25.V.2001, leg. A. SMOLIS; female, male and juvenile on slide, P, Nizina Śląska (lowland), near Wielobłoto village, valley of Odra river, willow shrub, decaying wood, 1.X.1999, leg. R. J. POMORSKI; 3 females and 3 males on slides, P, Nizina Śląska (lowland), Wrocław, "Wojnowski" forest, oak-hornbeam forest, litter, 9.IV.2001, leg. D. SKARŻYŃSKI; numerous specimens on slides, P, Pojezierze Pomorskie (lakeland), Pojezierze Kaszubskie (lakeland), nature reserve „Staniszewskie Zdroje”, beech forest, decaying wood and under bark of rotting logs, 2.VII.2000, leg. A. SMOLIS; numerous specimens on slides, P, Baltic Coast, Wysoczyzna Elbląska,

nature reserve "Kadyński Las", under bark of rotting logs, decaying wood, 23.IX.2001, leg. A. SMOLIS; 2 males and 4 juveniles on slides, Slovakia, WCa, Slovenský Raj N. P., mixed forest, under bark of logs, decaying wood, 1.V.2000, leg. A. SMOLIS; male on slide, Slovakia, WCa, Slovak Karst, Zádalska valley, oak wood *Corneto-Quercetum*, S lopes, near canyon entrance, litter, 13.X.1998, leg. L. KOVÁČ, det. L. KOVÁČ; male on slide, Hungary, WCa, Aggtelek N. P., 19.I.1988, leg. Gy. TRASER. If not otherwise stated, other material is preserved in the Department of Biodiversity and Evolutionary Taxonomy of Wrocław University, Poland.

D i a g n o s i s. Habitus typical of the genus *Deutonura*. Dorsal tubercles well developed. 2+2 dark pigmented eyes present. Buccal cone short. Labral chaetotaxy 4/2, 4. Mandible thin with 3 teeth. Head with 3 chaetae Oc, chaetae A, B, C, D, E present, chaeta O absent. Tubercles Af and Cl on head separate. Tubercle Af with non-reticulate area between chaetae A and B. Tubercles Dl and (L+So) on head with 5 and 10 chaetae respectively. Tubercles De on thoracic terga II and III with 3 and 4 chaetae respectively. Tubercles L on abd. III and IV with 4 and 8-9 chaetae respectively. Cryptopygy well developed. Claw without inner tooth.

R e d e s c r i p t i o n. Habitus typical of the genus. Body length (without antennae): females 1.9-3.8 mm, males 1.8-2.8 mm, I instars 0.8-1.2 mm. Colour of the body variable, from white to dark blue (see variability). 2+2 medium size, dark pigmented eyes (Figs 28, 36).

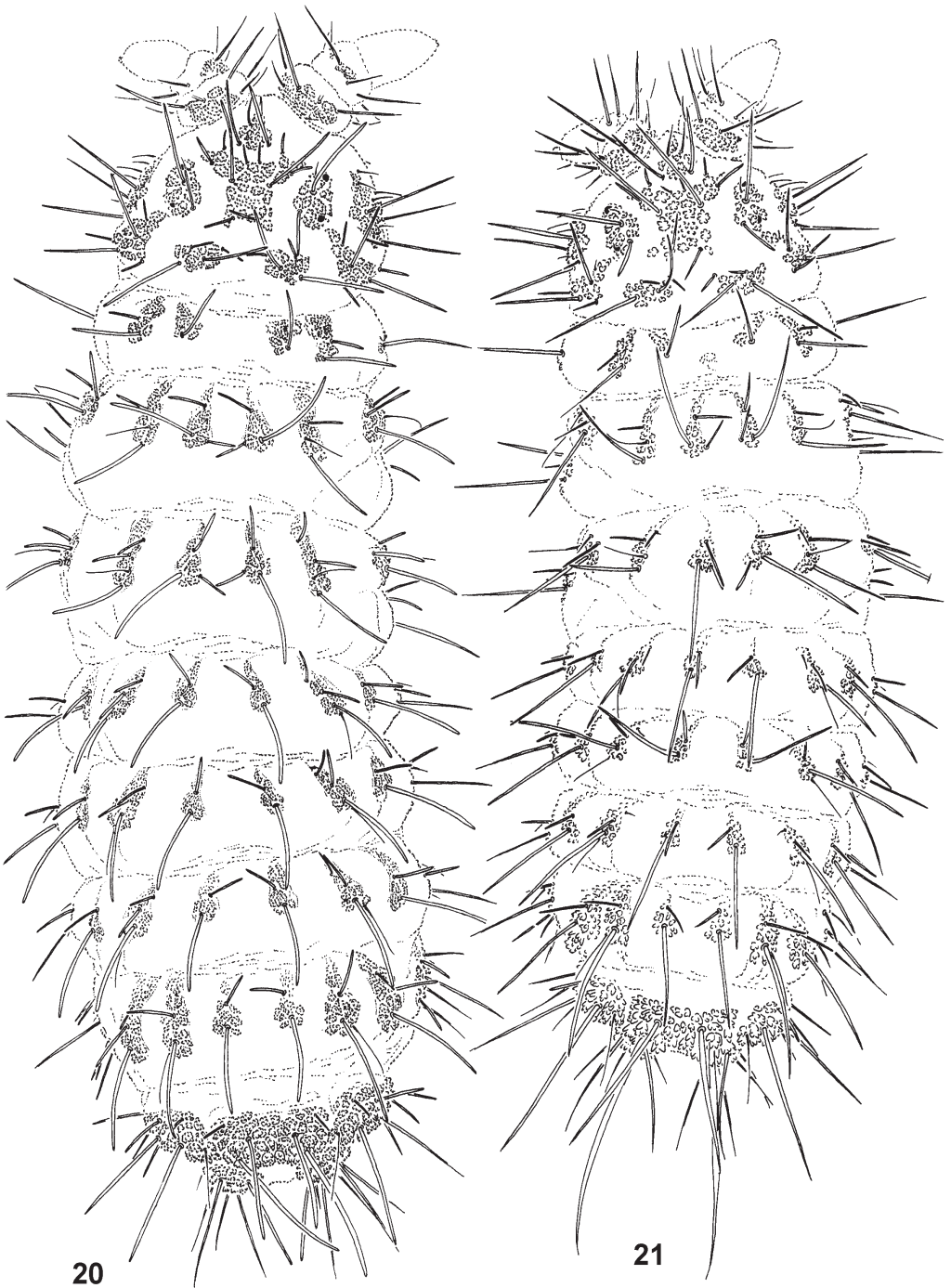
Types of dorsal ordinary chaetae. Macrochaetae Ml relatively long, thickened, almost cylindrical, arc-like or straight, widely sheathed, apically rounded (Figs 25, 27, 28-32, 39); macrochaetae Mc and Mcc relatively thick, rounded at apex; mesochaetae and microchaetae short, thin and pointed. Macrochaetae in I instars long (especially on abd. V, Figs 21-22), rapidly tapered, thin, arc-like, narrowly sheathed, apically pointed (Fig. 26). All macrochaetae distinctly serrated. Same number and arrangement of chaetae in adults and I instars, except chaetotaxy of ant. IV (see Tab. 2c) and genital plate (complete absence of chaetae in first instars).

Head. Buccal cone rather short (Figs 33, 37). Labrum rounded, with ventral sclerifications as in Fig. 34. Labrum chaetotaxy 4/2, 4 (Fig. 33). Chaetotaxy of labium as in Fig. 34. Maxilla styliform, mandible thin and tridentate. Chaetotaxy of antennae in adults and I instars as in Tab. 2c. Apical vesicle distinct, trilobate. Sensilla S on ant. IV long and thin. Group d on ant. III with 5 chaetae. Chaetotaxy of head as in Tab. 2a and b, and Figs 28-32, 36-37. Tubercles Cl and Af separate (Fig. 28). Tubercle Af with small non-reticulate area between chaetae A and B. Chaeta O absent. Elementary tubercle DE present, EE preset or absent (see Variability, Figs 28-32). Elementary tubercles DE and BE sometimes built of two tubercles. Tubercle Dl with 5 chaetae, chaeta Dl3 absent (Figs 28, 36). Tubercle (L+So) with 10 chaetae, chaeta So2 as Mcc or mi (Fig. 28, 36). Chaeta A shorter than B.

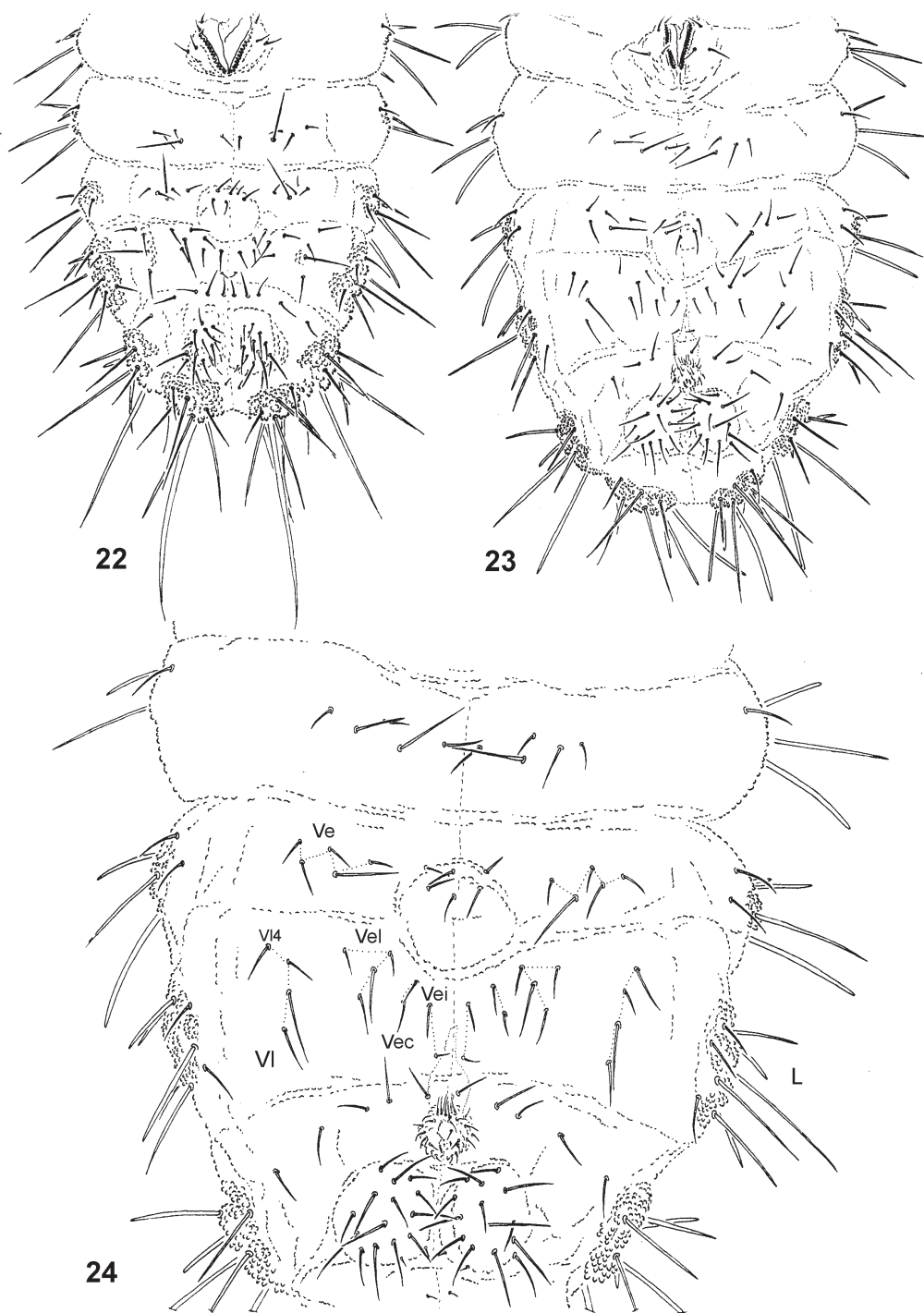
Thorax, abdomen, legs. Body sensilla fine and smooth, shorter than nearby macrochaetae (Figs 27, 35). Chaetotaxy of th. and abd. as in Tab. 2d and in Figs 20-27, 35-36, 38-39. Tubercles De on th. II with 3 chaetae (Fig. 27). Chaetae De3 on abd. I-III shorter than De2. Chaetae Di3 in I instars as microchaete, often hard to see (Fig. 26). Furca rudimentary without microchaetae (Fig. 24). Tubercle L on abd. IV with 8-9 chaetae (Fig. 38). Chaeta L' on abd. V present. Reticulation on anal lobes absent or poorly marked. Cryptopygy relatively well developed (Fig. 23). Abd. VI partly visible from dorsal side. Chaetotaxy of legs as in Tab. 2d. Femora I, II, III with 13, 12, 11 chaetae respectively. Claw without inner tooth.

D i s c u s s i o n. *Deutonura albella* belongs to the *phlegrea* group (DEHARVENG 1982a). Within this group, the mentioned species, *D. weinerae* DEHARVENG, 1982, *D. plena* (STACH, 1951) and *D. czarnohorensis* DEHARVENG, 1982, resemble each other in morphology (e.g. absence of chaeta Dl3 on head) and distribution; they constitute the Carpathian species-group. Because of the presence of non-reticulate area in tubercle Af on head, *D. albella* is the most similar to *D. czarnohorensis*, from which it can be easily distinguished in the number of chaetae De on th. II (3 in *albella*, 4 in *czarnohorensis*).

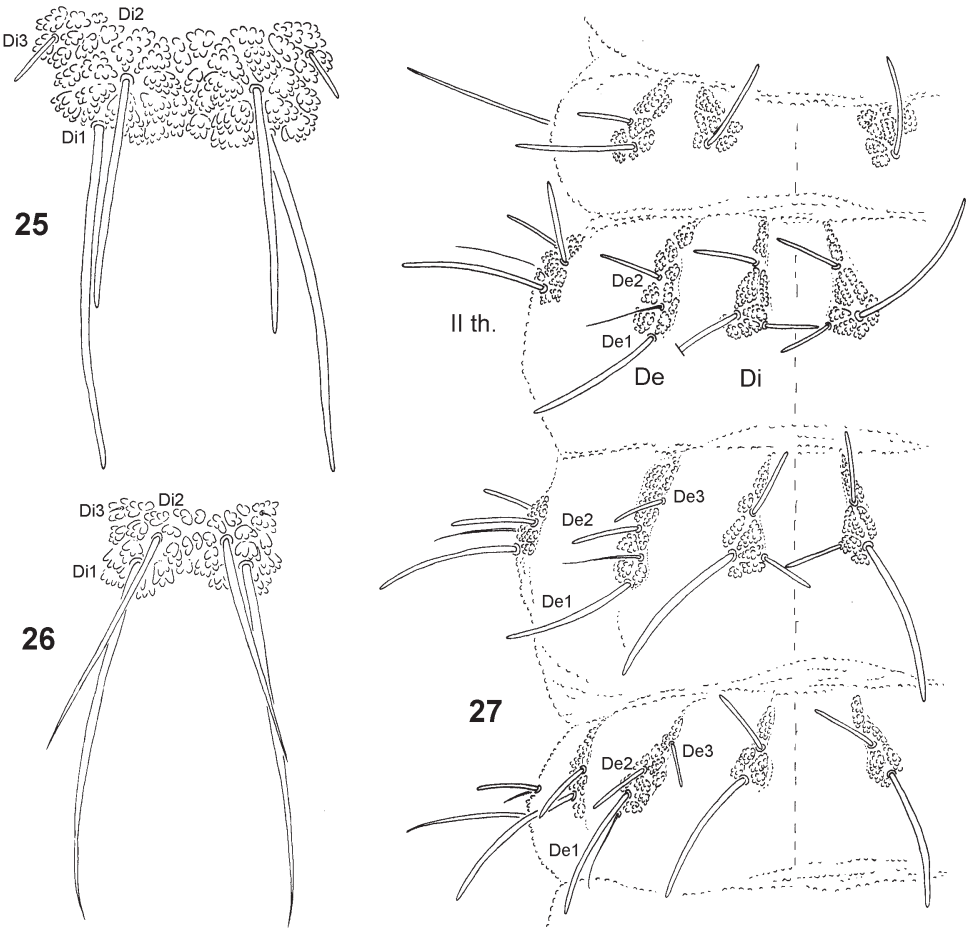
V a r i a b i l i t y. The intensity of pimentation is very variable in some Polish populations of *D. albella* and specimens from nearly white to dark blue were collected on the same area. The mentioned variation was observed in Carpathian populations mainly, very rare in the others.



Figs 20-21. *Deutonura albella* (STACH, 1920): 20 – chaetotaxy and distribution of tubercles, adult (dorsal view); 21 – chaetotaxy and distribution of tubercles, first instar (dorsal view).



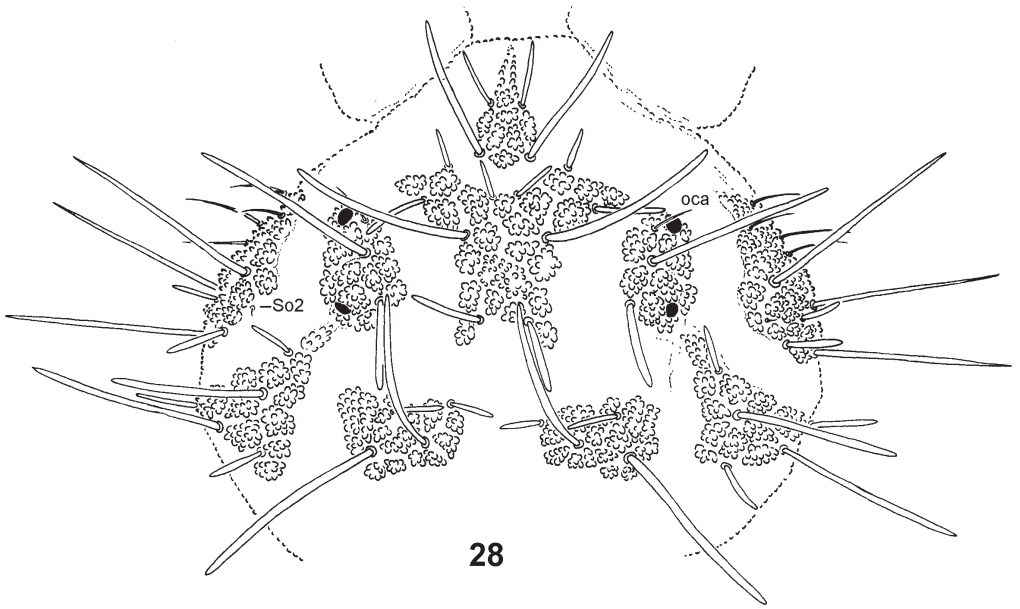
Figs 22-24. *Deutonympha albella* (STACH, 1920): 22 – chaetotaxy and distribution of tubercles on abdomen, first instar (ventral view); 23 – chaetotaxy and distribution of tubercles on abdomen, adult (ventral view); 24 – chaetotaxy of abd. II-VI (ventral view).



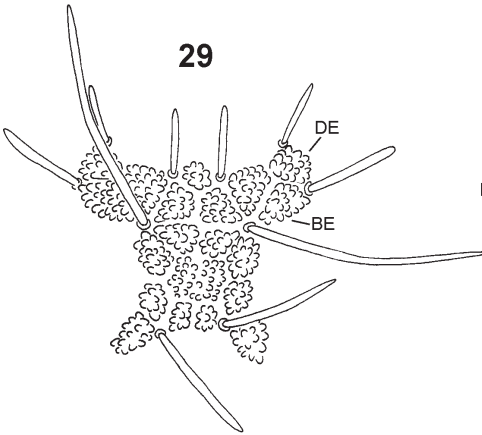
Figs 25-27. *Deutonura albella* (STACH, 1920): 25 – tubercle (Di+Di) of abd. V, adult; 26 – tubercle (Di+Di) of abd. V, first instar; 27 – dorsal chaetotaxy of th. and abd. I.

The number of elementary tubercles within tubercle Af on head was also highly variable in the studied material. I observed the following “types” of tubercle Af in Polish populations:

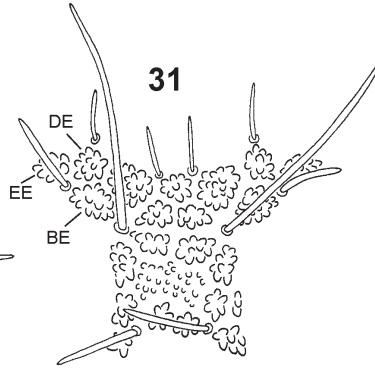
- a/a – absence of tubercles EE on both side of Af (Fig. 29),
- a/b – presence of EE on a one side Af only,
- b/b – presence of EE on both side of Af (Fig. 31),
- b/c – presence of EE on both side of Af and presence of “double” tubercle BE (composed of two tubercles) on a one side of Af,
- c/c – presence of EE and “double” BE on both side of Af (Fig. 30),
- b/d – presence of EE on both side of Af and presence of “double” tubercle DE on a one side of Af,
- d/d – presence of EE and “double” DE on both side of Af (Fig. 32),
- e/e – presence of EE, “double” DE and BE on both side of Af.



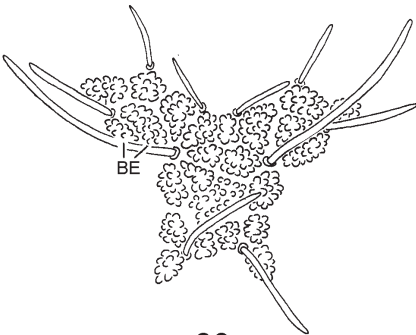
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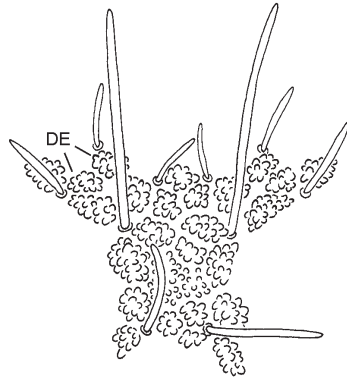
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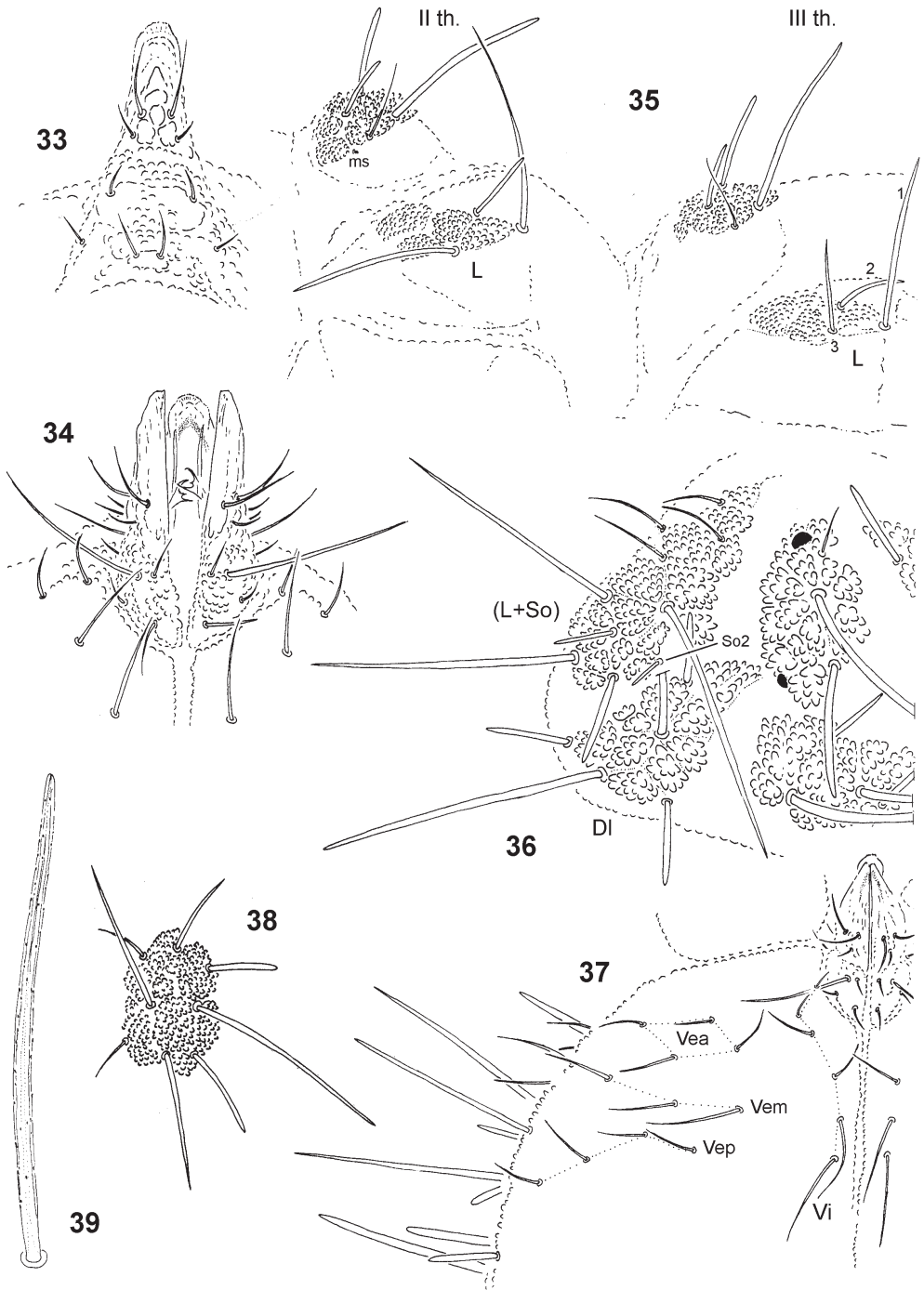


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Figs 28-32. *Deutonura albella* (STACH, 1920): 28 – chaetotaxy of head (dorsal view); 29-32 – different types of tubercle Af on head.



Figs 33-39. *Deutonura albella* (STACH, 1920): 33 – labrum; 34 – labium; 35 – chaetotaxy of th. II–III (lateral view); 36 – chaetotaxy of tubercles Oc, DI and (L+So) on head; 37 – ventral chaetotaxy of head; 38 – tubercle L of abd. IV; 39 – chaeta Di I on abd. V, adult.

Table 2

Chaetotaxy of *Deutonura albella* (STACH, 1920):

a) Cephalic chaetaotaxy-dorsal side.

Tubercle	Number of chaetae	Types of chaetae	Names of chaetae
Cl	4	MI Mc	F G
Af	10	MI Mc Mc or Mcc Mcc	B A E C, D
Oc	3	MI Mc mi	Ocm Ocp Oca
(Di+De)	4	MI Mc or Mcc Mcc	Di1, De1 De2 Di2
DI	5	MI Mc lub Mcc	DI5, DI1 DI4, DI6, DI2
(L+So)	10	MI Mc or Mcc Mcc or mi me	L1, L4, So1 L2, L3 So2 So3-6

b) Cephalic chaetaotaxy-ventral side.

Group	Number of chaetae
Vi	6
Vea	4
Vem	3
Vep	4
labium	11, 0x

c) chaetotaxy of antennae.

Segment, Group	Number of chaetae	Segment, Group	Number of chaetae	
I	7	IV	Adult	I instar
II	12			
III	5 sensilla AO III			
ve	5	ap	8 bs, 5 miA	8 bs, 5 miA
vc	4	ca	2 bs, 3 miA	2 bs, 3 miA
vi	4	cm	3 bs, 1 miA	3 bs, 1 miA
d	5	cp	8 miA, 1 brs	8 miA

d) Postcephalic chaetotaxy.

Terga					Legs				
	Di	De	DI	L	Scx2	Cx	Tr	Fe	T
th. I	1	2	1	-	0	3	6	13	19
th. II	3	2+s	3+s+ms	3	2	7	6	12	19
th. III	3	3+s	3+s	3	2	8	6	11	18
					Sterna				
abd. I	2	3+s	2	3	TV: 4				
abd. II	2	3+s	2	3	Ve: 5 Vel - present				
abd. III	2	3+s	2	4	Vel: 5			Fu: 6-8 me	0 mi
abd. IV	2	2+s	3	8-9	Vel: 4	Vec: 2	Vei: 2	VI: 4	
abd. V	(3+3)	7+s			Ag: 3			VI: 1	L': 1
abd. VI	7				Ve: 14			An: 2mi	

Other types were observed sporadically and therefore are not treated here. The frequency of the above-mentioned types in three Polish populations is presented in Tab. 3.

Distribution. In the context of the last revision of the *phlegrea* group (DEHARVENG 1982a) and significant taxonomic changes in the species complex, many earlier records of *D. phlegrea* (CAROLI, 1912) and *D. stachi* (GISIN, 1952), especially from Central Europe, may pertain to this species. Undoubtedly, these data require verification. Hitherto certainly recorded from mountain areas in Slovakia, Austria, Hungary, former Yugoslavia, Moldova and Ukraine (DEHARVENG 1982a; KOVÁČ 1998; KOVÁČ et al. 2005; KAPRUS' et al. 2006; BUŞMACHIU & DEHARVENG 2008; TRASER 1999, identified as *Deutonura phlegrea*). In Poland the species is widely distributed and known from numerous localities in the Carpathians (Tatra Mts., as *Neanura (Lathriopyga) stachi* ab. *albella*, STACH 1964; Pieniny Mts., as *N. (L.) stachi* ab. *albella*, STACH 1964, as *Lathriopyga phlegrea* and *L. plena*, WEINER 1981; Kotlina Nowotarska (basin), DEHARVENG 1982a; Beskid Żywiecki Mts., SKARŻYŃSKI & SMOLIS 2006; Beskid Sądecki Mts., SMOLIS & SKARŻYŃSKI 2006; Beskid Niski Mts., SMOLIS & SKARŻYŃSKI 2003; Bieszczady Wysokie Mts., STERZYŃSKA & KAPRUS' 2000; Bieszczady Niskie Mts., Beskid Śląski, see material), the Sudetes (SKARŻYŃSKI 2003), the Wyżyna Krakowsko-Wieluńska (upland) (as *N. (L.) stachi* ab. *albella*, STACH 1964; as *N. (L.) phlegrea*, SZEPTYCKI 1967), the Roztocze (upland) (KAPRUS' 1998), the Wyżyna Małopolska (upland) the Nizina Wielkopolsko-Kujawska (lowland), the Nizina Śląska (lowland), the Baltic Coast and the Pojezierze Pomorskie (Lakeland) (localities from last four regions, see material). Two last given records significantly extend the range of *D. albella* to the north.

Ecological remarks. A woodland saproxylophilous species, in mountains lives in different types of forests, e.g. stands of beech, oak, fir, spruce, sycamore and alder. In uplands and lowlands prefers humid shady beech and fir forests, growing on steep slopes and deep ravines, sporadically found in oak-hornbeam woods and willow shrubs. It was collected in caves (KOVÁČ 1998; WEINER 1981). Found predominantly under bark of decomposed logs and in humid rotting wood, rare in litter, soil, mosses and under stones. First instars have been collected in April, May, June, August, September and October.

Remarks. According to DEHARVENG (1982a), a designated lectotype was albino. In the light of the observed variability of body colour in *D. albella*, should be simply a light form.

Table 3

Variability of tubercle Af on head in three Polish populations of *Deutonura albella* (STACH, 1920) (Abbreviations used: Pop – populations; Sud – East Sudetes, Śnieżnik range, Wapniarka Mt.; Ca1 – West Carpathians, Beskid Żywiecki Mts., Babia Mt.; Ca2 – West Carpathians, Beskid Sądecki Mts., near Muszyna village; TNS – total number of specimens; types of tubercle AF – see variability of *D. albella*).

Pop	Types of tubercle Af								TNS
	a/a	a/b	b/b	b/c	c/c	b/d	d/d	e/e	
Sud	56 81.2%	9 13.0%	2 2.9%	0 0%	0 0%	0 0%	2 2.9%	0 0%	69 100%
Ca1	0 0%	0 0%	44 63.7%	11 16.0%	2 2.9%	10 14.5%	0 0%	2 2.9%	69 100%
Ca2	0 0%	6 5.7%	61 57.5%	8 7.5%	3 2.8%	22 20.8%	2 1.9%	4 3.8%	106 100%

Deutonura stachi (GISIN, 1952)

Figs 40-59, Tab. 4-6

Lathriopyga stachi GISIN, 1952:6*Deutonura stachi*: DEHARVENG 1982a: 13

Type material. Lectotype male on slide, Ukraine, East Carpathians, Chornohora Range, 1934-1935, leg. J. STACH, det. L. DEHARVENG. Paralectotypes, male on slide, same data as lectotype; male on slide, same data, "Zaroślak", 28.VI.1935, as lectotype. leg. J. STACH, det. L. DEHARVENG (collection of the Institute of Systematics and Evolution of Animals, Polish Academy of Sciences, Cracow, Poland).

Other material. (Abbreviations used: P – Poland; WCa – Western Carpathians; ECa – Eastern Carpathians; WS – Western Sudetes; ES – Eastern Sudetes; N. P. – National Park; ISEZ – collection of Institute of Systematics and Evolution of Animals, Polish Academy of Sciences, Cracow, Poland). Female and male on slide, P., Wyżyna Małopolska (upland), near Orłowiny village, litter, 18.VII.1934, leg. E. Panow, det. L. DEHARVENG (ISEZ); male on slide, P, WCa, Pieniny Mts., Pieniński N. P., S slope of Macelowa Mt., 650 m alt., relict pine forest, 21.VI.1975, leg. W. M. WEINER (ISEZ); numerous specimens on slides, P, WCa, Pieniny Mts., Pieniński N. P., valleys of Pieniński and Huliński stream, 600 m alt., Carpathian beech forest, under bark of rotting logs, in decaying wood and litter, 30.IV, 2.V.1999, leg. A. SMOLIS; 3 females, 2 males and 2 juveniles on slides, P, WCa, Pieniny Mts., Pieniński N. P., S slope of Facimiech Mt., 600 m alt., fir forest, n rotting wood, 1.V.1999, leg. A. SMOLIS; female on slide, P, Wca, Tatra Mts., Tatrzński N. P., Tomanowa valley, 1500 m alt., dwarf-pine shrubs, soil under stones, 14.VI.2000, leg. A. SMOLIS, D. SKARŻYŃSKI; female and juvenile on slide, P, Wca, Tatra Mts., Tatrzński N. P., Kościeliska valley, near entrance of Mylna cave, 1200 m alt., Norway spruce forest (subalpine belt), litter, 14.VI.2000, leg. A. SMOLIS, D. SKARŻYŃSKI; numerous specimens on slides, P, WCa, Beskid Śląski Mts., near Ustroń, NE slope of Wielka Czantoria Mt., valley of Suchy stream, 650 m alt., Carpathian beech forest, in decaying wood, 16.IV.2001, leg. A. SMOLIS; numerous specimens on slides, P, WCa, Beskid Sądecki Mts., near Muszyna village, nature reserve "Las lipowy Obrożyńska", W slope of Mikowa Mt., 500-600 m alt., oak-hornbeam and beech-fir forest, under bark of decomposed log and in rotting wood, 26-28.IV.1999, leg. A. SMOLIS; numerous specimens on slides, P, WCa, Beskid Sądecki Mts., nature reserve "Uhryń", 800 m alt., beech-fir forest, in decaying wood, litter, 3.V.2000, 13.V.2001, leg. A. SMOLIS, D. SKARŻYŃSKI; numerous individuals on slides, P, WCa, Beskid Niski Mts., near Tylawa village, nature reserve "Przełom Jasiołki", N slope of Ostra Mt., 400-600 m alt., sycamore forest, Carpathian beech forest, oak-hornbeam and Carpathian alder forest, under bark of rotting logs, decaying wood, soil, mosses and litter, 5.V.2000, 28.X.2000, 12.V.2001, 16.VI.2001, leg. A. SMOLIS, D. SKARŻYŃSKI; male on slide, P, WCa, Beskid Niski Mts., Magurski N. P., near Huta Polańska village, valley of Zimna Woda stream, 500 m alt., Carpathian beech forest, decaying wood, 14.VI.2001, leg. A. SMOLIS; numerous specimens on slides, P., Eca, Bieszczady Wysokie Mts., near Komańcza village, nature reserve "Przełom Oslawy pod Duszatynem", NE slope of Karnaflów Mt., 500-600 m alt., Carpathian beech-fir forest, under bark of rotting logs, decaying wood and litter, 30.IV-2.V.2001, leg. A. SMOLIS; female and 3 males on slides, P, Eca, Bieszczady Wysokie Mts., near Polańczyk village, Carpathian beech forest, litter, 1.VIII.1991, leg. D. SKARŻYŃSKI; numerous individuals on slides, P, ECa, Bieszczady Wysokie Mts., Bieszczadzki N. P., N slopes of Mała Rawka Mt. and Krzemień Mt., 1000 m alt., Carpathian beech and beech-fir forest, decaying wood and litter, 19.V. 2000, leg. A. SMOLIS; numerous specimens on slides, P, Eca, Bieszczady Wysokie Mts., near Duszatyn village, nature reserve "Przełom Oslawy pod Duszatynem", valley of Oslawa river, 450 m alt., Carpathian alder forest, in decaying wood, 2.V.2001, leg. A. SMOLIS; juvenile on slide, P, Roztocze (upland), Roztoczański N. P., Bukowa Góra Mt., fir forest, litter and soil, 28.IX.1990, leg. I. KAPRUS', det. I. KAPRUS'; 3 females on slide, P, Pojezierze Pomorskie lakeland, Pojezierze Kaszubskie (lakeland), nature reserve „Staniszewskie Zdroje”,

beech forest, decaying wood and under bark of rotting logs, 2.VII.2000, leg. A. SMOLIS; 4 females, male and juvenile on slides, P, Baltic Coast, Wycieczna Elbląska, nature reserve "Buki Wysoczyzny Elbląskiej", under bark of rotting logs, decaying wood, 23.IX.2001, leg. A. SMOLIS; female on slide, Ukraine, ECa, Chornohora Range, Worochta village, under bark of spruce, 15.VI.1924, leg. S. SMRECZYŃSKI, L. DEHARVENG (ISEZ); 2 females and juvenile on slides, Ukraine, ECa, Chornohora Range, „Zaroślak”, 1400 m alt., Norway spruce forest (subalpine belt), decaying wood, under bark of rotting logs, 7.IX.1999, 10.IX.1999, 12.IX.1999, leg. R. J. POMORSKI, D. SKARŻYŃSKI, A. SMOLIS; 3 females, male and 2 juveniles, Ukraine, ECa, Chornohora Range, south slope of Howerla Mt., 1000 m alt., Carpathian beech forest (montane belt), under bark of logs and in rooting wood, 11.IX.1999, leg. A. SMOLIS; male on slide, Hungary, WCa, Aggtelek N. P., 19.I.1988, leg. Gy. TRASER, det. Gy. TRASER. If not otherwise stated, other material is preserved in the Department of Biodiversity and Evolutionary Taxonomy of Wrocław University, Poland.

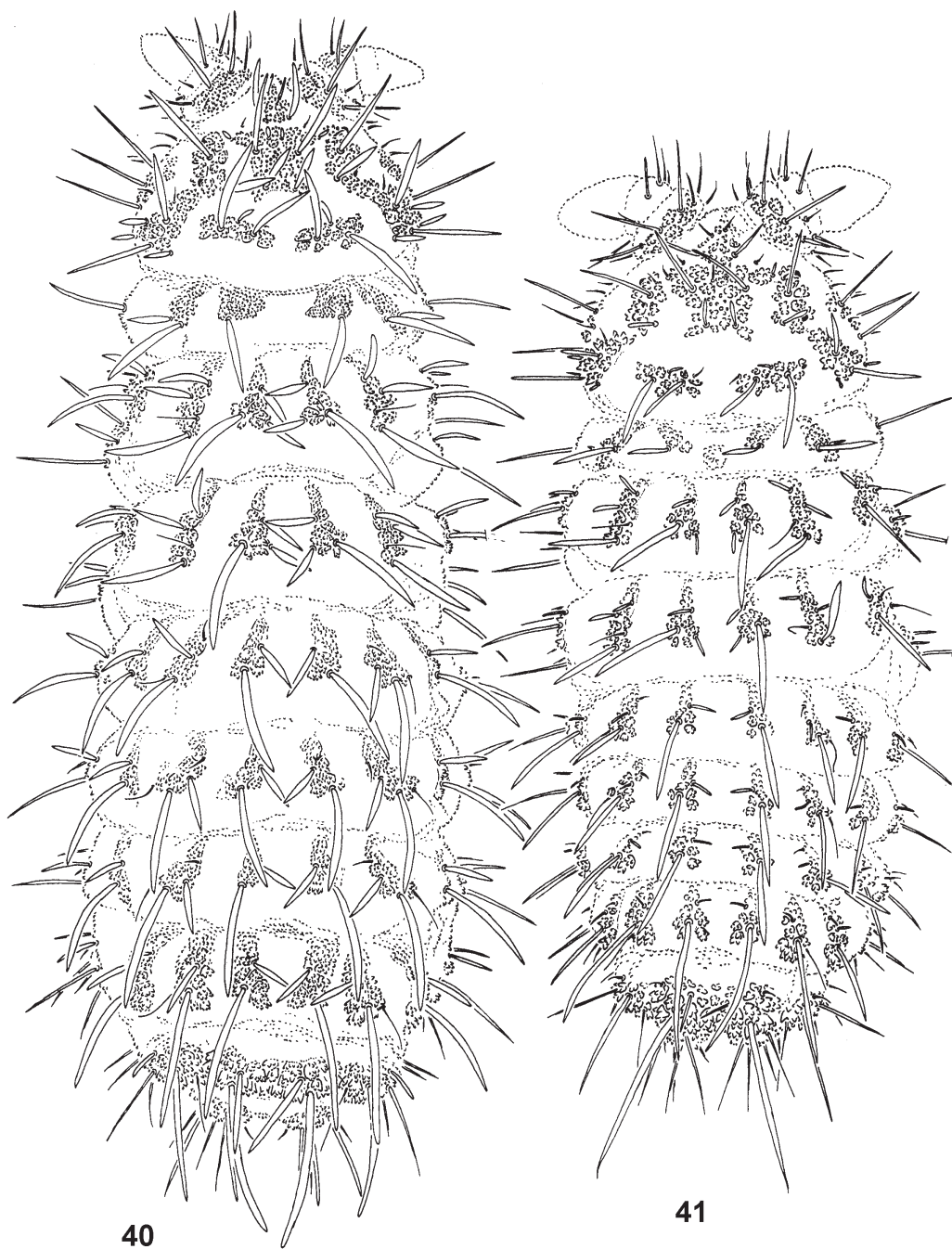
D i a g n o s i s. Habitus typical of the genus *Deutonura*. Dorsal tubercles well developed. 2+2 dark pigmented eyes. Buccal cone short. Labral chaetotaxy 4/2, 4. Mandible thin with 3 teeth. Head with 3 chaetae Oc, chaetae A, B, C, D, E present, chaeta O absent. Tubercles Af and Cl on head separate. Tubercle Af with non-reticulate area between chaetae A and B. Tubercles Dl and (L+So) on head with 6 and 8-9 chaetae respectively. Tubercles De on thoracic terga II and III with 4 chaetae. Tubercles L on abd.III and IV with 4 and 7 chaetae respectively. Cryptopygy well developed. Claw without inner tooth.

R e d e s c r i p t i o n. Habitus typical of the genus. Body length (without antennae): females 1.2-2.9 mm, males 1.1-1.7 mm, I instars 0.6-1.0 mm. Colour of the body slightly variable, from light to dark blue. 2+2 medium size, dark pigmented eyes (Figs 45-46, 54).

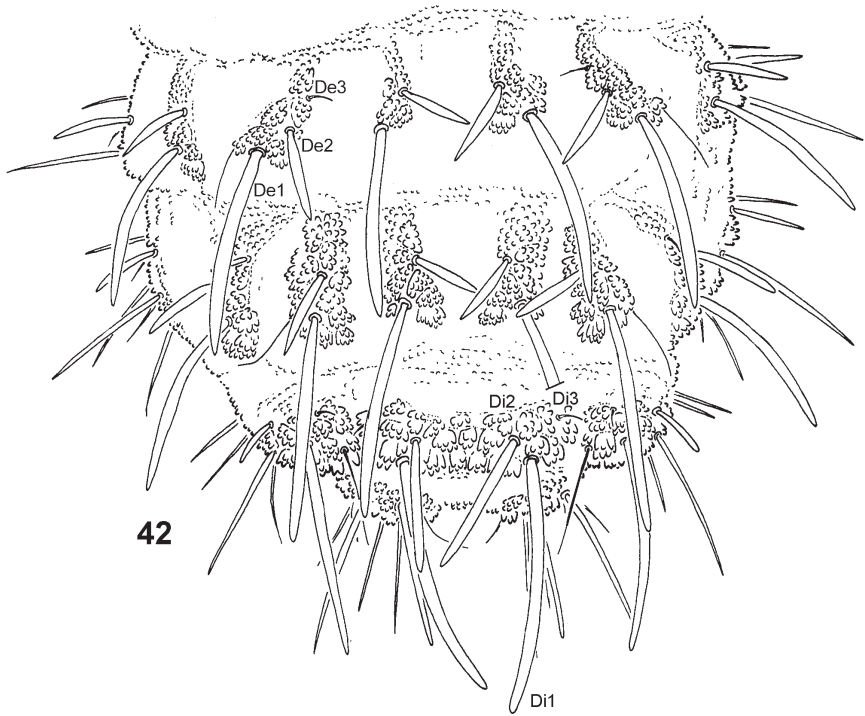
Types of dorsal ordinary chaetae. Macrochaetae Ml relatively long, strongly or slightly thickened (see: Variability), fusiform or subcylindrical, broadly or narrowly sheathed, arc-like or straight, apically rounded (Figs 40, 42, 45-50, 54, 56); macrochaetae Mc and Mcc thick, fusiform, rounded at apex; mesochaetae and microchaetae short, thin and pointed. Macrochaetae in I instars similar in shape, but Ml on V abd. apically pointed (Figs 41, 44). Dorsal side of macrochaetae densely covered by minute denticles (Figs 47-50). Same number and arrangement of chaetae in adults and I instars, except chaetotaxy of ant. IV (see Tab. 4c) and genital plate (complete absence of chaetae in first instars).

Head. Buccal cone rather short (Fig. 53). Labrum rounded, with ventral sclerifications as in Fig. 52. Labrum chaetotaxy 4/2, 4 (Fig. 51). Chaetotaxy of labium as in Figs 52-53. Maxilla styliform, mandible thin and tridentate. Chaetotaxy of antennae in adults and I instars as in Tab. 4c. Apical vesicle distinct, trilobate. Sensilla S on ant.IV long and thin (Fig. 57). Group d on ant. III with 5 chaetae. Chaetotaxy of head as in Tab. 4a and b, and Figs 45-46, 52-54. Tubercles Cl and Af separate (Fig. 45). Tubercle Af with non-reticulate area between chaetae A and B. Chaeta O absent. Elementary tubercles DE and EE absent. Chaeta D free, developed as mi or Mcc (see variability). Tubercle (Di+De) with chaeta Di2 microchaeta or rare Mcc (Tab. 5). Tubercle Dl with 6 chaetae, chaeta Dl3 present, developed as mi, Mcc or Mc (see variability). Tubercle (L+So) with 8-9 chaetae, chaeta So2 present or absent, but always as mi (Fig. 54). Chaetae So3-6 sometimes free. Group Vea with 3 or 4 chaetae (see variability). Chaeta A shorter than B.

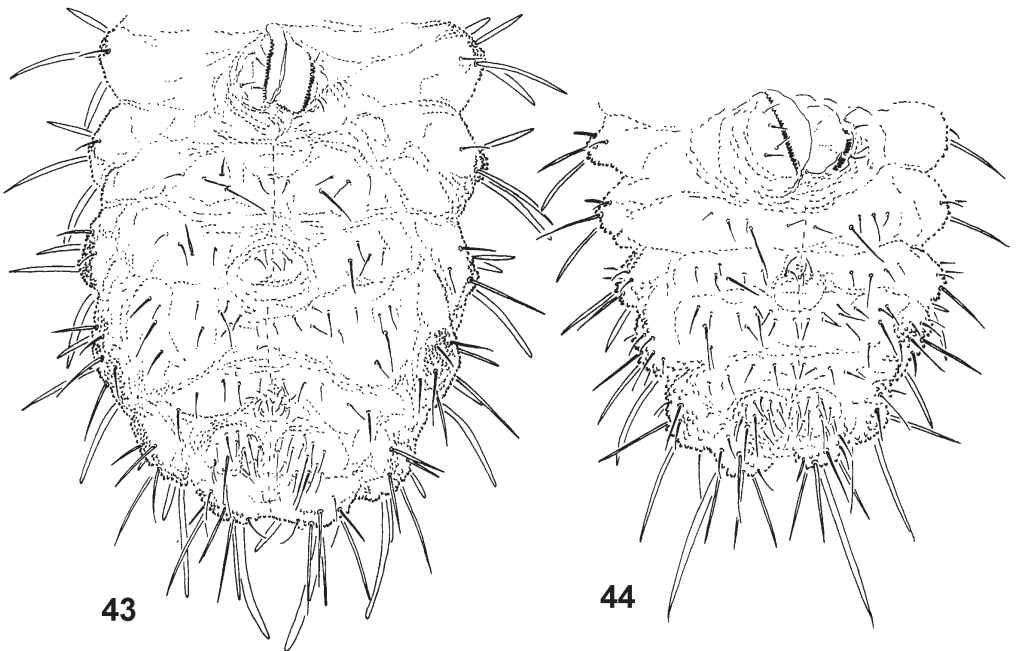
Thorax, abdomen, legs. Body sensilla fine and smooth, distinctly shorter than nearby macrochaetae (Figs 42, 45-46, 56). Chaetotaxy of th. and abd. as in Tab. 4d and in Figs 40-46, 55-56, 58-59. Tubercles De on th. II with 4 chaetae (Figs 45-46). Chaetae De3 on abd. I-III shorter than De2, usually as mi, rarely as Mcc. Chaeta Di3 on abd. V as mi, Mc or Mcc (see: variability). Furca rudimentary without microchaetae (Fig. 59). Group Ve on abd. III with 4 or 5 chaetae (Figs 58-59, see variability). Tubercle L on abd. IV with 7 chaetae (Fig. 55). Chaeta L' on abd. V present. Reticulation on anal lobes absent or poorly marked. Cryptopygy well developed. Abd. VI partially visible from dorsal side (Figs 40, 42). Chaetotaxy of legs as in Tab. 4d. Femora I, II, III with 13, 12, 11 chaetae respectively. Claw without inner tooth.



Figs 40-41. *Deutonura stachi* (GISIN, 1952): 40 – chaetotaxy and distribution of tubercles, adult (dorsal view); 41 – chaetotaxy and distribution of tubercles, first instar (dorsal view).



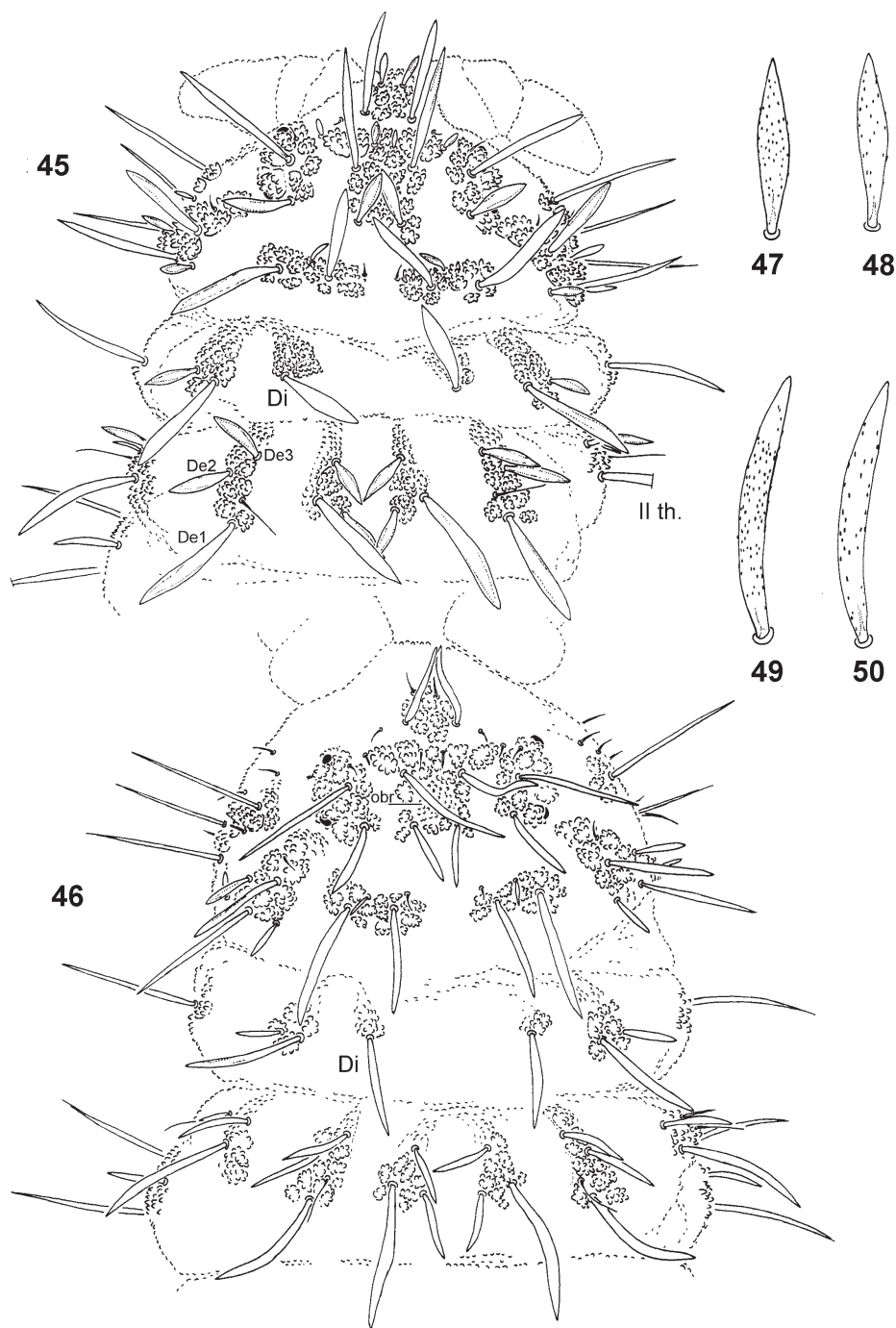
42



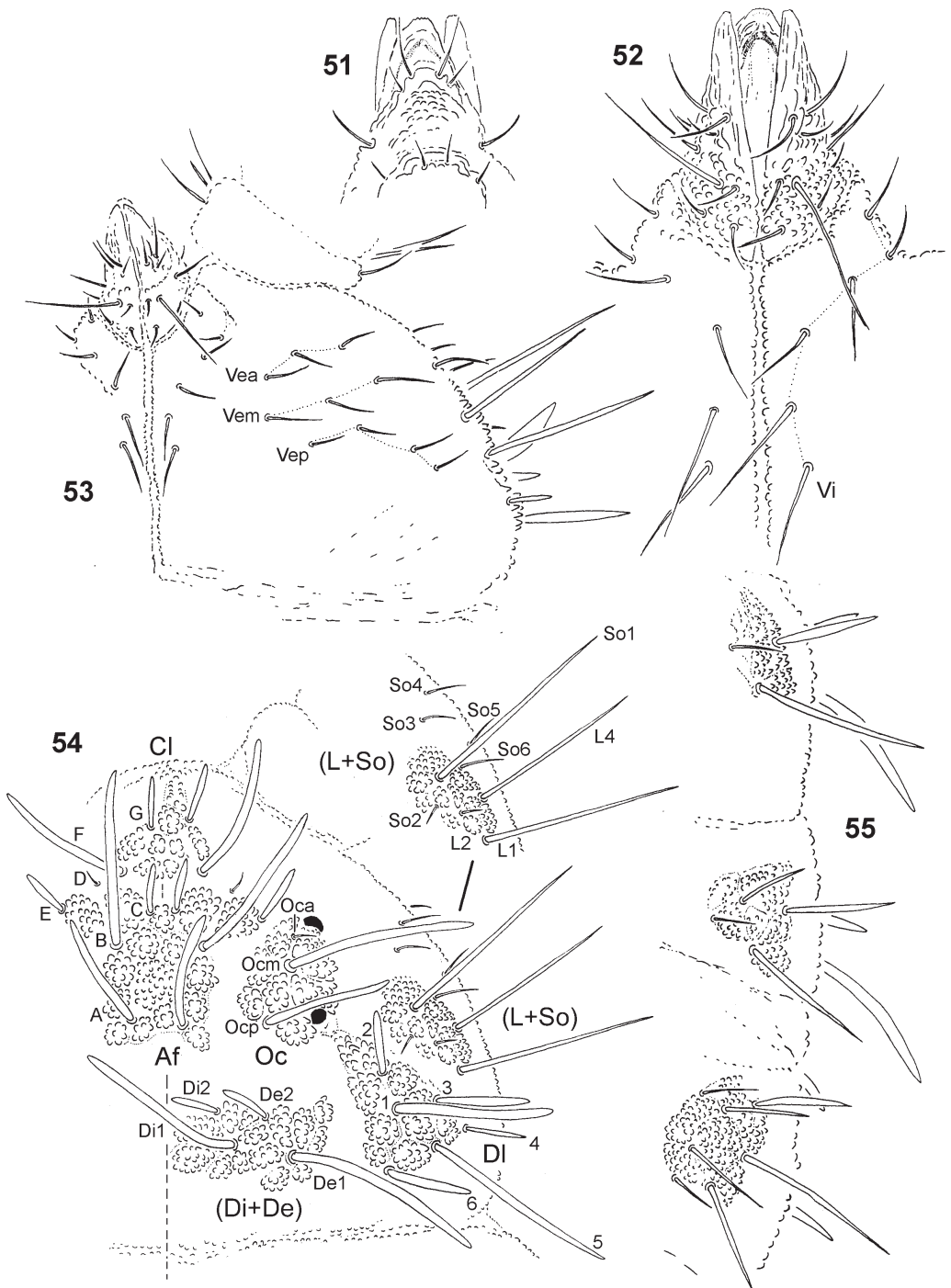
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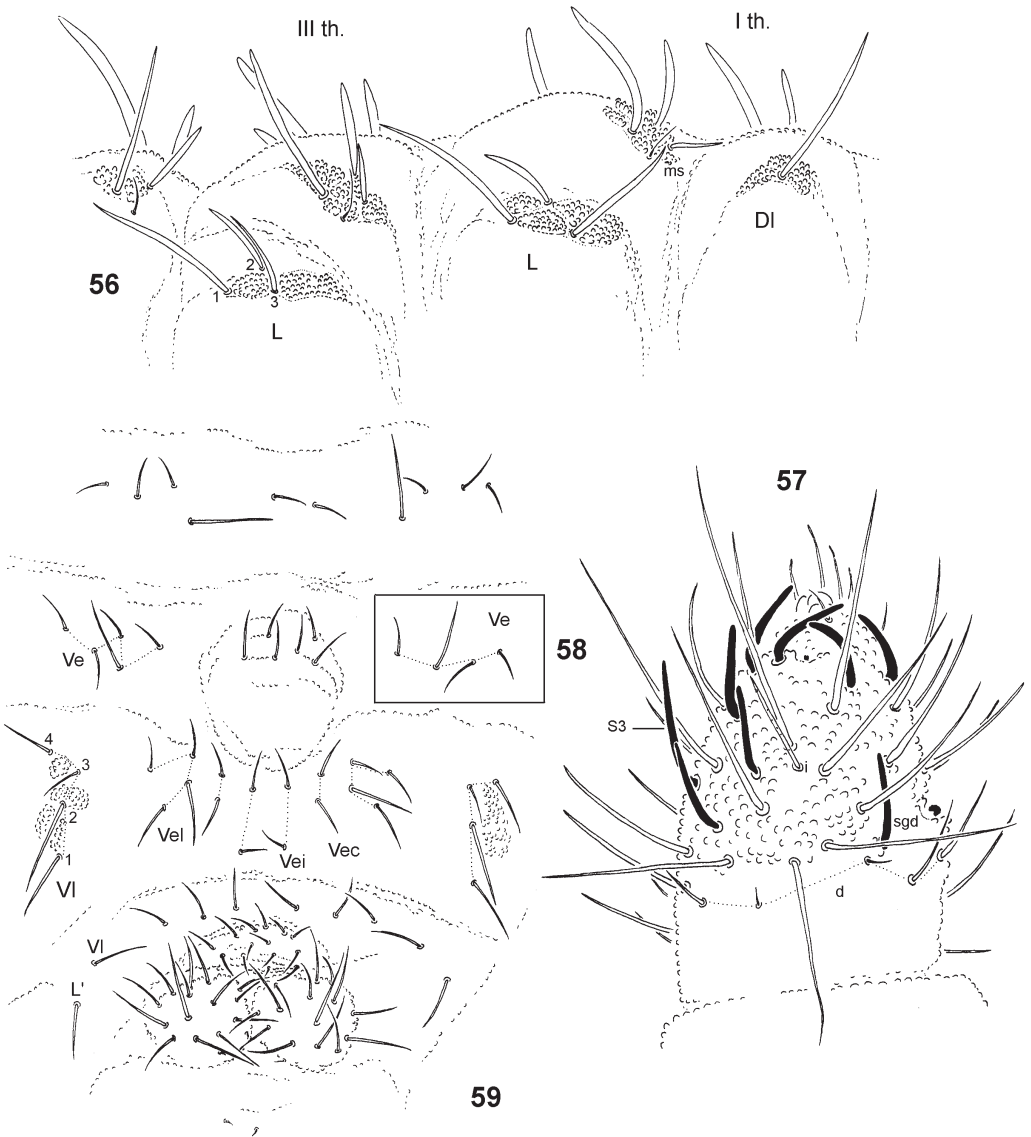
Figs 42-44. *Deutonura stachi* (GISIN, 1952): 42 – abd. III-VI (dorsal view); 43 – chaetotaxy and distribution of tubercles on abdomen, adult (ventral view); 44 – chaetotaxy and distribution of tubercles on abdomen, first instar (ventral view).



Figs 45-50. *Deutonura stachi* (GISIN, 1952): 45 – dorsal chaetotaxy of head and th. I-II (specimen from Pieniny Mts.); 46 – dorsal chaetotaxy of head and th. I-II (specimen from *terra typica*, Chornohora Range); 47-48 – chaeta Di on th. I (specimen from Pieniny Mts.); 47 – dorsal view; 48 – ventral view; 49-50 – chaeta Di1 on th. II (specimen from Pieniny Mts.); 49 – dorsal view; 50 – ventral view.



Figs 51-55. *Deutonura stachi* (GISIN, 1952): 51 – labrum; 52 – labium and group Vi; 53 – ventral chaetotaxy of head; 54 – chaetotaxy of head (dorsolateral view); 55 – chaetotaxy of tubercles L on abd. II-IV.



Figs 56-59. *Deutonura stachi* (GİSIN, 1952): 56 – chaetotaxy of th. and abd. I (lateral view); 57 – dorsal chaetotaxy of ant. III-IV, adult; 58 – chaetotaxy of group Ve of abd. III (specimen from Pieniny Mts.); 59 – ventral chaetotaxy of abd. II-V (specimen from Bieszczady Wysokie Mts.).

Discussion. Among known members of the *phlegrea* group the species is the most similar to *D. atlantica* DEHARVENG, 1982 described from Portugal, from which it differs in the presence/absence of non-reticulate area in tubercle Af on head (presence in *stachi*, absence in *atlantica*) and presence/absence of elementary tubercle DE on head (absence in *stachi*, presence in *atlantica*).

Table 4

Chaetotaxy of *Deutonura stachi* (GISIN, 1952):

a) Cephalic chaetaotaxy-dorsal side.

Tubercle	Number of chaetae	Types of chaetae	Names of chaetae
Cl	4	MI Mc, Mcc or mi	F G
Af	10	MI Mc Mcc or mi	B A C, E, D
Oc	3	MI Mc mi	Ocm Ocp Oca
(Di+De)	4	MI Mcc or Mcc Mcc or mi	Di1, Del De2 Di2
DI	6	MI Mc or Mcc Mc, Mcc or mi	DI5, DI1 DI4, DI6 DI2, DI3
(L+So)	8-9	MI Mcc or mi me or mi	L1, L4, So1 L2 So2-6

b) Cephalic chaetaotaxy-ventral side.

Group	Number of chaetae
Vi	6
Vea	3-4
Vem	3
Vep	4
labium	11, 0x

c) chaetotaxy of antennae.

Segment, Group	Number of chaetae	Segment, Group	Number of chaetae	
I	7	IV	Adult	I instar
II	12		or, 8 S, i, 12 mou, 6 brs, 2 iv	or, 2 S, i, 6 mou, 1 brs, 2 iv
III	5 sensilla AO III			
ve	5			
vc	4	ap	8 bs, 5 miA	8 bs, 5 miA
vi	4	ca	2 bs, 3 miA	2 bs, 3 miA
d	5	cm	3 bs, 1 miA	3 bs, 1 miA
		cp	8 miA, 1 brs	8 miA

d) Postcephalic chaetotaxy.

Terga					Legs				
	Di	De	DI	L	Scx2	Cx	Tr	Fe	T
th. I	1	2	1	-	0	3	6	13	19
th. II	3	3+s	3+s+ms	3	2	7	6	12	19
th. III	3	3+s	3+s	3	2	8	6	11	18
					Sterna				
abd. I	2	3+s	2	3	TV: 4				
abd. II	2	3+s	2	3	Ve: 5 Vel - present				
abd. III	2	3+s	2	4	Vel: 4-5			Fu: 4-6 me me	0 mi
abd. IV	2	2+s	3	7	Vel: 4	Vec: 2	Vei: 2	VI: 4	
abd. V	(3+3)	7+s			Ag: 3			VI: 1	L': 1
abd. VI	7				Ve: 13-14			An: 2mi	

Table 5

Variability of the shape of chaetae D, Di2, DI2 on head and chaeta Di3 on abd. V in two Polish populations of *Deutonura stachi* (GISIN, 1952) (Abbreviations used: Pop – populations; P – West Carpathians, Pieniny Mts.; B – East Carpathians, Bieszczady Wysokie Mts., in – individuals; mi – microchaeta; M – macrochaeta Mcc or Mc)

Pop	Names of chaetae (location)											
	D (head)			Di2 (head)			DI2 (head)			Di3 (abd. V)		
	Types of chaetae			Types of chaetae			Types of chaetae			Types of chaetae		
	mi/mi	mi/M	M/M	mi/mi	mi/M	M/M	mi/mi	mi/M	M/M	mi/mi	mi/M	M/M
P (28 in)	23 82.1%	4 14.3%	1 3.6%	26 93%	2 7%	0 0%	21 75%	4 14.3%	3 10.7%	19 67.9%	3 10.7%	6 21.4%
B (42 in)	34 81%	4 9.5%	4 9.5%	31 73.8%	3 7.2%	8 19%	1 2.4%	1 2.4%	40 95.2%	8 19%	1 2.4%	33 78.6%

Variability. The shape of dorsal chaetae and their number in groups (L+So), Ve on head and Ve on abd. III vary both within and between the studied populations. The variability of these characters within two populations from Poland are presented in Tab. 5-6 and illustrated (Figs 45-50, 58-59).

Distribution. In the light of the revision of *phlegrea* group (DEHARVENG 1982a) all earlier reports of the occurrence of *D. stachi* require confirmation. Till now the species is certainly recorded from Moldova (BUŞMACHIU & DEHARVENG 2008), Hungary (as *Deutonura* cf. *stachi*, TRASER 1999), Rumania (DÁNYI et al. 2006) and Ukraine (DEHARVENG 1982a, KAPRUS' et al. 2006). Furthermore, it is known from many Polish locations in the Carpathians (Tatra Mts., Pieniny Mts., Kotlina Nowotarska (basin), STACH 1964; Beskid Żywiecki Mts., SKARŻYŃSKI & SMOLIS 2006; Beskid Sądecki Mts., SMOLIS & SKARŻYŃSKI 2006; Beskid Niski Mts., SMOLIS & SKARŻYŃSKI 2003; Bieszczady Wysokie Mts., STERZYŃSKA & KAPRUS' 2000; Bieszczady Niskie Mts., Beskid Śląski, see material), the Wyżyna Małopolska (upland) (STACH 1964), the Roztocze (upland) (KAPRUS' 1998), the Baltic Coast and the Pojezierze Pomorskie (lakeland) (last two records, see material). Last two mentioned localities of the species represent a considerable northward extension of the known range.

Table 6

The length of adults, shape of macrochaetae Mc, number of chaetae Ve on head and Ve on abd. III, presence/absence of chaeta So2 on head in two Polish populations of *Deutonura stachi* (GISIN, 1952) (Abbreviations used: Pop – populations; P – West Carpathians, Pieniny Mts.; B – East Carpathians, Bieszczady Wysokie Mts.; in – individuals; ff – fusiform; sc – subcylindrical; bs – both sides of body; pr – present; ab – absent)

Pop	Length (in mm)		Shape of Mc	Chaeta or groups of chaetae (location)							
	females	males		Vea (head)			Ve (abd. III)			So2 (head)	
				Number of chaetae on bs			Number of chaetae on bs			pr	ab
				3/3	3/4	4/4	4/4	4/5	5/5		
P (28 in)	1.2-1.7	1.1-1.2	ff	27 96.4%	1 3.6%	0 0%	17 61%	9 32%	2 7%	0 0%	28 100%
B (42 in)	1.5-2.9	1.4-1.7	sc	0 0%	3 7.2%	39 92.8%	4 9.5%	5 11.9%	33 78.6%	42 100%	0 0%

Ecological remarks. A woodland saproxylophilous species, in mountains found practically in all types of forests; beech, fir, spruce, sycamore and alder woods. Only one specimen was collected by me in dwarf mountain-pine shrubs, close to the timber line. In uplands and lowlands it is strongly confined to humid shady beech and fir forests, growing on steep slopes and deep ravines. It inhabits mainly in humid rotting wood and under bark of decomposed logs (in Carpathians most often accompanied by previous species), but also in litter, soil, mosses and under stones. First instars have been collected in April, May, June and September.

***Deutonura weinerae* DEHARVENG, 1982**

Figs 60-70, Tab. 7

Deutonura weinerae DEHARVENG, 1982a: 15

Type material. Holotype, female on slide, Ukraine, East Carpathians, Chornohora Range, "Zaroślak", 1934-35, leg. J. STACH. Paratypes: 2 females and 2 juveniles on slides, same data as holotype (collection of the Institute of Systematics and Evolution of Animals, Polish Academy of Sciences, Cracow, Poland).

Other material. Male on slide, Ukraine, East Carpathians, Chornohora Range, near Prut waterfall, N slope of Howerla Mt., 1500 m alt., subalpine herb vegetation, under stone, 10.IX.1999, leg. A. SMOLIS; 2 females, 3 males and 4 juveniles on slides, Poland, West Carpathians, Beskid Niski Mts., near Tylawa village, nature reserve "Przełom Jasiołki", N slope of Ostra Mt., 400 m alt., sycamore forest, decaying wood and litter under stones, 28.X.2000, leg. A. SMOLIS; female on slide, Poland, West Carpathians, Beskid Sądecki Mts., nature reserve "Barnowiec", 800 m alt., beech forest *Luzulo-Fagetum*, litter, 23.IX.2003, leg. A. SMOLIS, D. SKARŻYŃSKI. Other material is housed in the Department of Biodiversity and Evolutionary Taxonomy of Wrocław University, Poland.

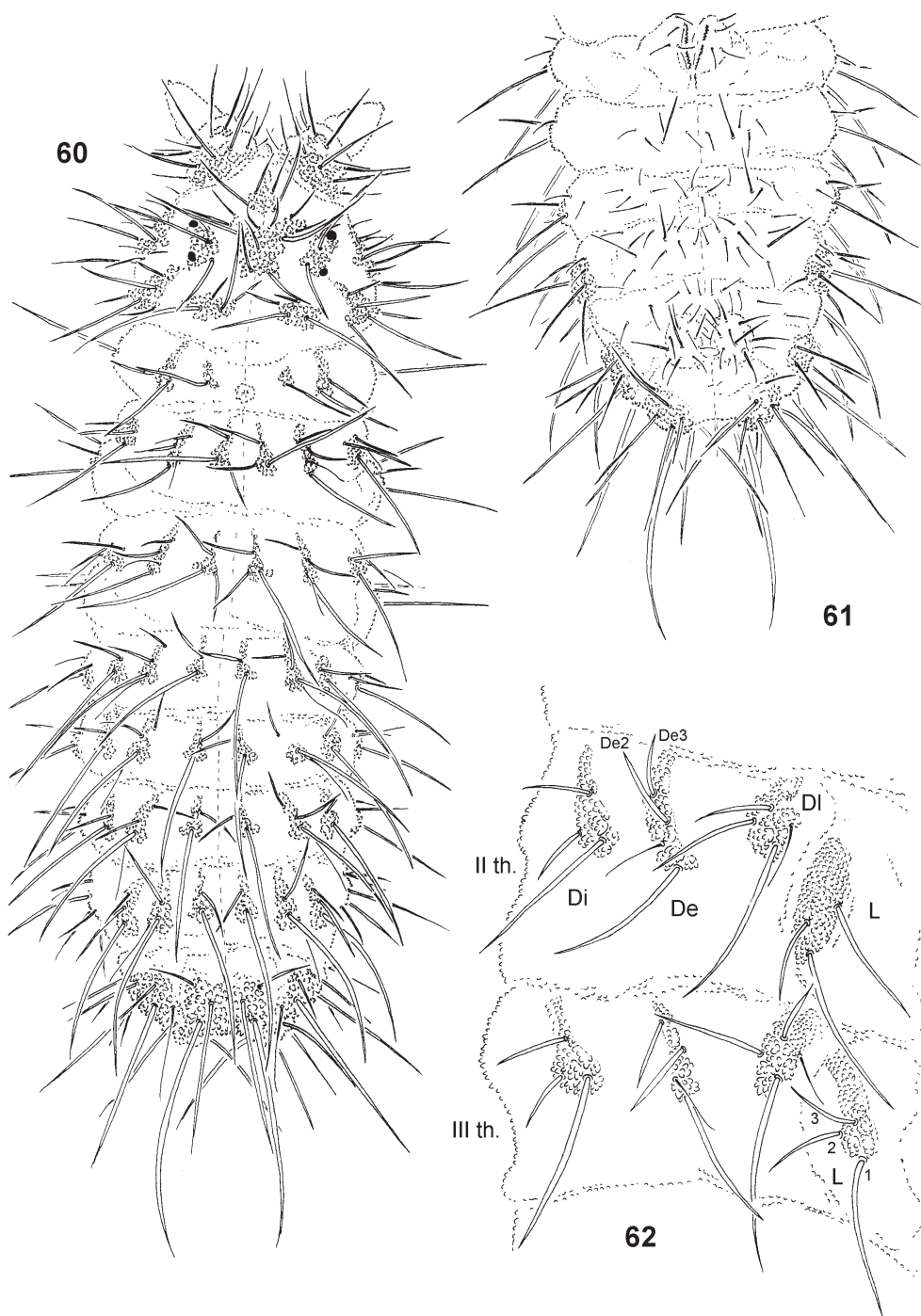
Diagnosis. Habitus typical of the genus *Deutonura*. Dorsal tubercles well developed. 2+2 dark pigmented eyes. Buccal cone short. Labral chaetotaxy 4/2, 4. Mandible thin with 3 teeth. Head with 3 chaetae Oc, chaetae A, B, C, D, E, O. Tubercles Af and Cl on head separate. Tubercle Af without non-reticulate area between chaetae A and B. Tubercles Dl and (L+So) on head with 5 and 10 chaetae respectively. Tubercles De on thoracic terga II and III with 4 chaetae. Tubercles L on abd.III and IV with 4 and 78 chaetae respectively. Cryptopygy relatively well developed. Claw without inner tooth.

Redescription. Habitus typical of the genus. Body length (without antennae): females 1.8-2.6 mm, males 1.8-2.0 mm, I instars 1.0-1.6 mm. Colour of the body variable, white to light blue. 2+2 large, dark pigmented eyes (Figs 60, 66).

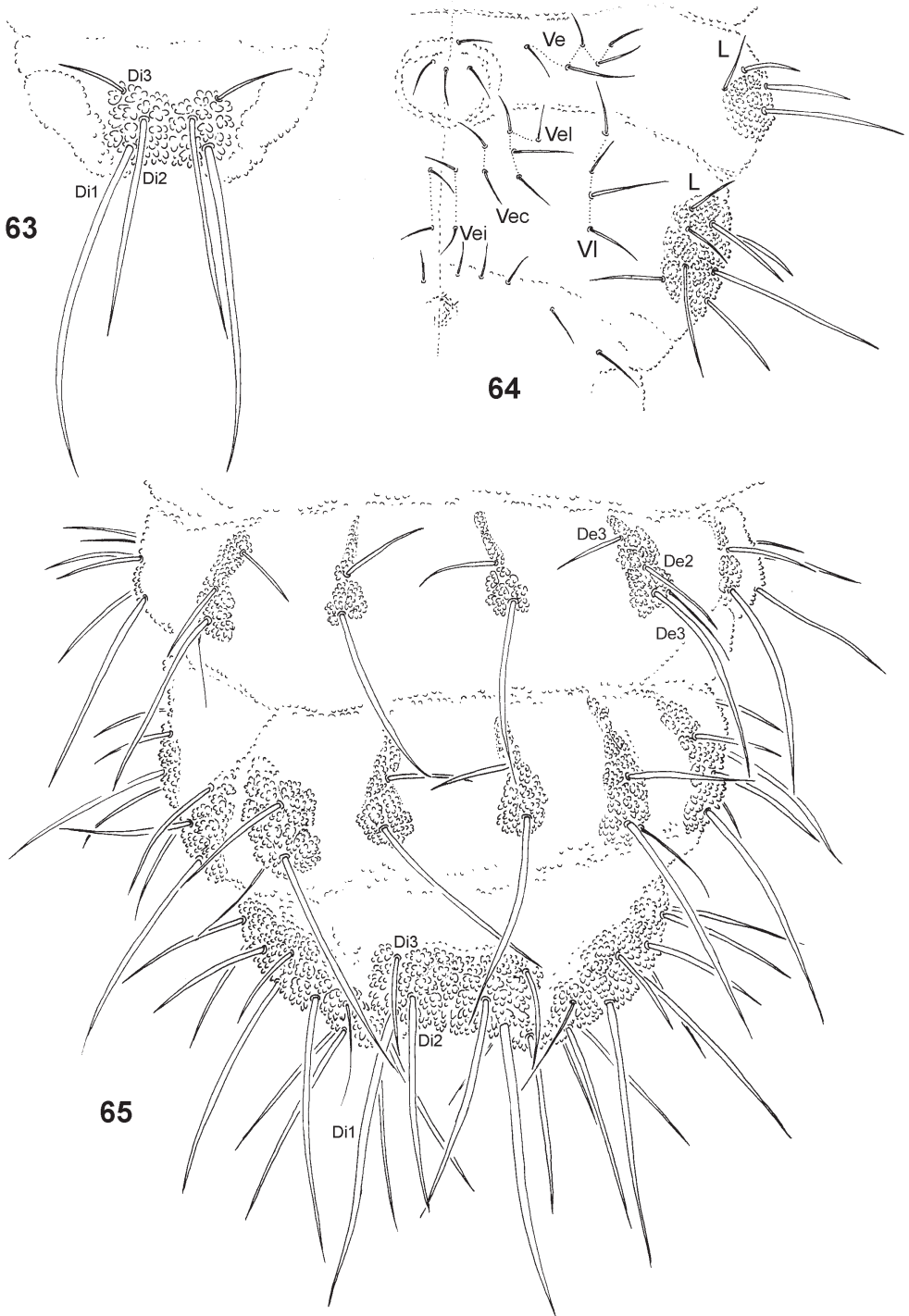
Types of dorsal ordinary chaetae. Macrochaetae Ml long, thin, rapidly tapered, arc-like, narrowly sheathed, apically pointed (Figs 62, 65-66, 68); macrochaetae Mc and Mcc relatively long, arc-like and pointed at apex; mesochaetae and microchaetae short, thin and pointed. Macrochaetae in I instars similar in shape (Figs 60, 63). All macrochaetae feebly serrated. Same number and arrangement of chaetae in adults and I instars, except chaetotaxy of ant. IV (see Tab. 7c) and genital plate (complete absence of chaetae in first instars).

Head. Buccal cone short (Fig. 67). Labrum rounded, with ventral sclerifications non-ogival (Figs 69-70). Labrum chaetotaxy 4/2, 4 (Fig. 70). Chaetotaxy of labium as in Fig. 69. Maxilla styliform, mandible thin and tridentate. Chaetotaxy of antennae in adults and I instars as in Tab. 7c. Apical vesicle distinct, trilobate. Sensilla S on ant.IV long and thin. Group d on ant. III with 5 chaetae. Chaetotaxy of head as in Tab. 7a and b, and Figs 66-67, 69. Tubercles Cl and Af separate (Fig. 66). Tubercle Af without non-reticulate area between chaetae A and B. Chaeta O present (Fig. 66). Elementary tubercles DE present, EE present or absent. Tubercle Dl with 5 chaetae, chaeta Dl3 absent. Tubercle (L+So) with 10 chaetae, chaeta So2 as Mcc (Fig. 66). Chaeta A shorter than B.

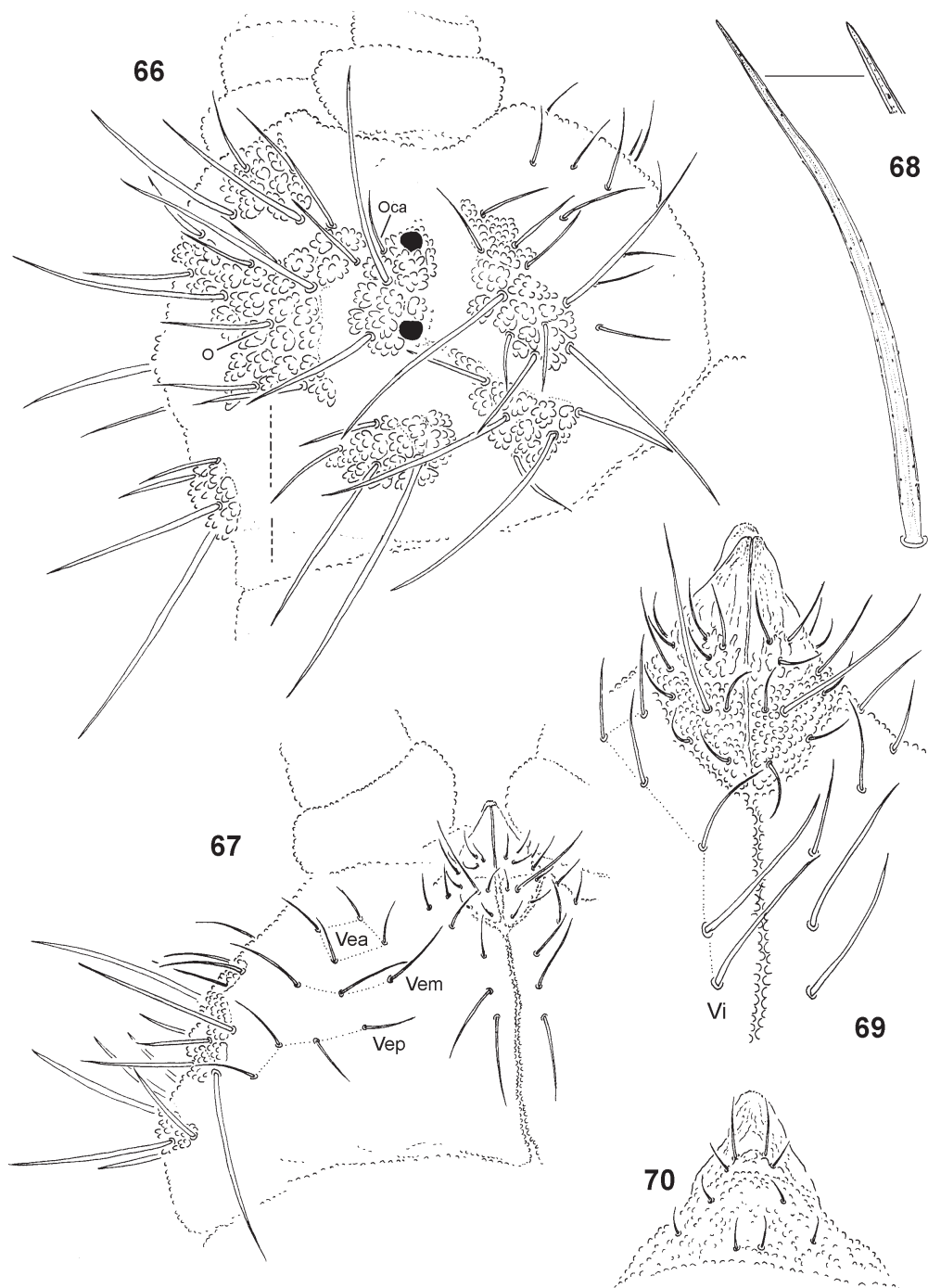
Thorax, abdomen, legs. Body sensilla fine and smooth, shorter than nearby macrochaetae (Figs 62, 65). Chaetotaxy of th. and abd. as in Tab. 7d and in Figs 60-65, 68. Tubercles De on th. II with 4



Figs 60-62. *Deutonura weinerae* DEHARVENG, 1982: 60 – chaetotaxy and distribution of tubercles, first instar (dorsal view); 61 – chaetotaxy and distribution of tubercles on abdomen, first instar (ventral view); 62 – chaetotaxy of th. II-III (dorso-lateral view).



Figs 63-65. *Deutonura weineriae* DEHARVENG, 1982: 63 – tubercle (Di+Di) of abd. V, first instar; 64 – ventral chaetotaxy of abd. III-V; 65 – chaetotaxy and distribution of tubercles on abd. III-VI, adult (dorsal view).



Figs 66-70. *Deutonura weineriae* DEHARVENG, 1982: 66 – chaetotaxy of head (dorsolateral view); 67 – ventral chaetotaxy of head; 68 – chaeta D11 of abd. V, adult; 69 – labium and group Vi; 70 – labrum.

Table 7

Chaetotaxy of *Deutonura weinerae* DEHARVENG, 1982:

a) Cephalic chaetaotaxy-dorsal side

Tubercle	Number of ch	Types of chaetae	Names of chaetae
Cl	4	MI Mc	F G
Af	11	MI Mc	B A, O, C, D, E
Oc	3	MI Mc me	Ocm Ocp Oca
(Di+De)	4	MI Mc	Di1, De1 Di2, De2
DI	5	MI Mc	DI5, DI1 DI4, DI6, DI2
(L+So)	10	MI Mc Mcc me	L1, L4, So1 L2 L3, So2 So3-6

b) Cephalic chaetaotaxy-ventral side

Group	Number of chaetae
Vi	6
Vea	4
Vem	3
Vep	4
labium	11, 0x

c) chaetotaxy of antennae

Segment, Group	Number of chaetae	Segment, Group	Number of chaetae	
I	7	IV	Adult	I instar
II	12		or, 8 S, i, 12 mou, 6 brs,	or, 2 S, i, 6 mou, 1 brs,
III	5 sensilla AO III		2 iv	2 iv
ve	5	ap	8 bs, 5 miA	8 bs, 5 miA
vc	4	ca	2 bs, 3 miA	2 bs, 3 miA
vi	4	cm	3 bs, 1 miA	3 bs, 1 miA
d	5	cp	8 miA, 1 brs	8 miA

d) Postcephalic chaetotaxy

Terga					Legs				
	Di	De	DI	L	Scx2	Cx	Tr	Fe	T
th. I	1	2	1	-	0	3	6	13	19
th. II	3	3+s	3+s+ms	3	2	7	6	12	19
th. III	3	3+s	3+s	3	2	8	6	11	18
					Sterna				
abd. I	2	3+s	2	3	TV: 4				
abd. II	2	3+s	2	3	Ve: 5 Ve1 - present				
abd. III	2	3+s	2	4	Vel: 5			Fu: 4-5 me	0 mi
abd. IV	2	2+s	3	7-8	Vel: 4	Vec: 2	Vei: 2	VI: 4	
abd. V	(3+3)	8-9+s			Ag: 3			VI: 1	L: 1
abd. VI	7				Ve: 13-14			An:2mi	

chaetae (Fig. 62). Chaetae De3 on abd. I-III slightly shorter than De2. Chaeta Di3 on abd. V in I instar as Mc (Figs 60, 63). Furca rudimentary without microchaetae (Fig. 64). Tubercle L on abd. IV with 7-8 chaetae (Fig. 64). Chaeta L' on abd. V present. Reticulation on anal lobes absent or poorly developed. Cryptopygy strongly developed (Fig. 65). Chaetotaxy of legs as in Tab. 7d. Femora I, II, III with 13, 12, 11 chaetae respectively. Claw without inner tooth.

Discussion. Within the informal Carpathian species-group (see: Discussion of *D. albella*), it is most similar to *D. plena* (STACH, 1951) described also from the Ukrainian Carpathians. They can be easily separated by the presence/absence of chaeta O on head (presence in *weinerae*, absence in *plena*) and the shape of dorsal macrochaetae (rapidly tapered and distinctly pointed in *weinerae*, cylindrical and rounded or slightly pointed in *plena*).

Distribution. The species was described by DEHARVENG (1982a) on the basis of Stach's material from the Chornohora range (Ukraine, Carpathians). Hitherto known from a few localities in Ukrainian (KAPRUS' et al. 2006) and Polish Carpathians (Beskid Niski Mts., SMOLIS & SKARŻYŃSKI 2003; Beskid Sądecki Mts., SMOLIS & SKARŻYŃSKI 2006).

Ecological remarks. A woodland montane species, inhabiting the litter, soil and rooting wood in beech and sycamore forests. Moreover, one specimen was collected by author under stone in herb vegetation of the subalpine zone. First instars have been collected in October only.

Deutonura plena (STACH, 1951)

Figs 71-73, Tab. 8

Lathriopyga phlegraea var. *plena* STACH, 1951: 83

Deutonura plena: DEHARVENG, 1982a: 11

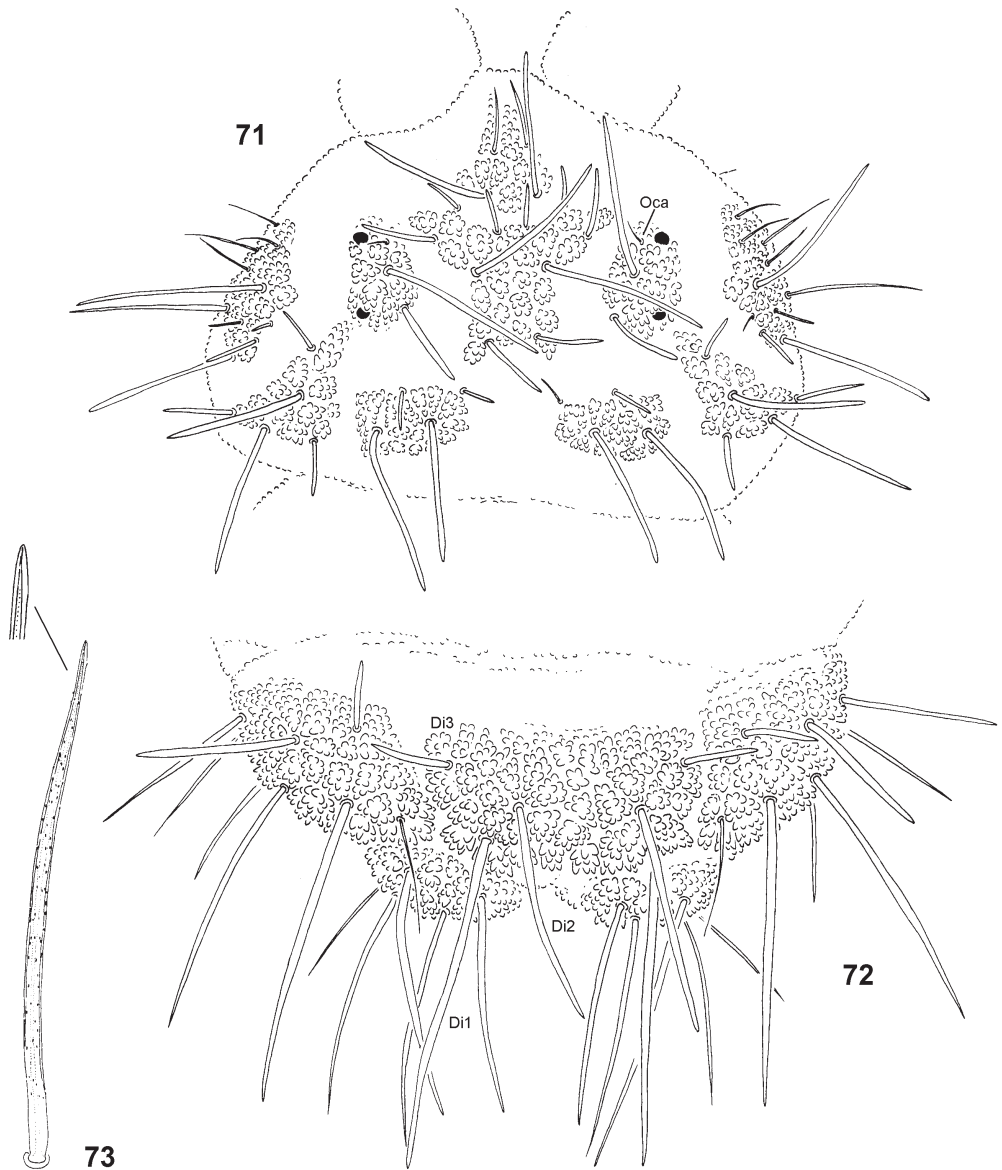
Type material. Lectotype female on slide, Ukraine, East Carpathians, Chornohora Range, 1934-35, leg. J. STACH, det. L. DEHARVENG. Paralectotypes, 15 specimens on slide, same data as lectotype (collection of the Institute of Systematics and Evolution of Animals, Polish Academy of Sciences, Cracow, Poland).

Other material. 3 females and 3 juveniles on slides, Ukraine, East Carpathians, Chornohora Range, „Zaroślak”, 1400 m alt., Norway spruce forest (subalpine belt), decaying wood, under bark of rotting logs, 7.IX.1999, 10.IX.1999, 12.IX.1999, leg. R. J. POMORSKI, D. SKARŻYŃSKI, A. SMOLIS; 4 females and male on slides, East Carpathians, Chornohora Range, south slope of Howlerla Mt., 1000 m alt., Carpathian beech forest (montane belt), under bark of logs and in rooting wood, 11.IX.1999, leg. A. SMOLIS. Other material is deposited in the Department of Biodiversity and Evolutionary Taxonomy of Wrocław University, Poland.

Diagnosis. Habitus typical of the genus *Deutonura*. Dorsal tubercles well developed. 2+2 dark pigmented eyes. Buccal cone short. Labral chaetotaxy 4/2, 4. Mandible thin with 3 teeth. Head with 3 chaetae Oc, chaetae A, B, C, D, E (chaeta O absent). Tubercles Af and Cl on head separate. Tubercle Af without non-reticulate area between chaetae A and B. Tubercles Dl and (L+So) on head with 5 and 10 chaetae respectively. Tubercles De on thoracic terga II and III with 4 chaetae. Tubercles L on abd. III and IV with 4 and 7-8 chaetae respectively. Cryptopygy well developed. Claw without inner tooth.

Redescription. Habitus typical of the genus. Body length (without antennae): females 2.5-3.5 mm, males 1.8-1.9 mm, I instars 1.0-1.3 mm. Colour of the body light blue, very rare white. 2+2 medium size, dark pigmented eyes (Fig. 71).

Types of dorsal ordinary chaetae. Macrochaetae Ml relatively long, relatively thick, almost cylindrical, arc-like or straight, narrowly sheathed, apically rounded or slightly pointed (Figs 71-73); macrochaetae Mc and Mcc relatively thick, rounded at apex; mesochaetae and microchaetae short, thin and pointed. Macrochaetae in I instars similar in shape. All macrochaetae distinctly serrated (Fig. 73). Same number and arrangement of chaetae in adults and I instars, except chaetotaxy of ant. IV (see Tab. 8c) and genital plate (complete absence of chaetae in first instars).



Figs 71-73. *Deutonura plena* (STACH, 1951): 71 – chaetotaxy of head (dorsal view); 72 – chaetotaxy of abd. V-VI, (dorsal view); 73 – chaeta Di1 of abd. V, adult.

Table 8

Chaetotaxy of *Deutonura plena* (STACH, 1951):

a) Cephalic chaetaotaxy-dorsal side.

Tubercle	Number of chaetae	Types of chaetae	Names of chaetae
Cl	4	MI Mc	F G
Af	10	MI Mc Mcc	B A, E C, D
Oc	3	MI Mc mi	Ocm Ocp Oca
(Di+De)	4	MI Mcc	DI1, De1 DI2, De2
DI	5	MI Mc or Mcc	DI5, DI1 DI4, DI6, DI2
(L+So)	10	MI Mc or Mcc Mcc Mcc or mi me	L1, L4, So1 L2 L3 So2 So3-6

b) Cephalic chaetaotaxy-ventral side.

Group	Number of chaetae
Vi	6
Vea	4
Vem	3
Vep	4
labium	11, 0x

c) chaetotaxy of antennae.

Segment, Group	Number of chaetae	Segment, Group	Number of chaetae	
I	7	IV	Adult	I instar
II	12		or, 8 S, i, 12 mou, 6 brs, 2 iv or, 2 S, i, 6 mou, 1 brs, 2 iv	
III	5 sensilla AO III			
ve	5	ap	8 bs, 5 miA	8 bs, 5 miA
vc	4	ca	2 bs, 3 miA	2 bs, 3 miA
vi	4	cm	3 bs, 1 miA	3 bs, 1 miA
d	5	cp	8 miA, 1 brs	8 miA

d) Postcephalic chaetotaxy.

Terga					Legs				
	Di	De	DI	L	Scx2	Cx	Tr	Fe	T
th. I	1	2	1	-	0	3	6	13	19
th. II	3	3+s	3+s+ms	3	2	7	6	12	19
th. III	3	3+s	3+s	3	2	8	6	11	18
					Sterna				
abd. I	2	3+s	2	3	TV: 4				
abd. II	2	3+s	2	3	Ve: 5 Vel - present				
abd. III	2	3+s	2	4	Vel: 5			Fu: 5 me 0 mi me	
abd. IV	2	2+s	3	7-8	Vel: 4 Vec: 2 Vei: 2			VI: 4	
abd. V	(3+3)	8+s			Ag: 3			VI: 1 L': 1	
abd. VI	7				Ve: 14			An:2mi	

Head. Buccal cone short. Labrum rounded, with ventral sclerifications non-ogival. Labrum chaetotaxy 4/2, 4. Chaetotaxy of labium as in Tab. 8b. Maxilla styliiform, mandible thin and tridentate. Chaetotaxy of antennae in adults and I instars as in Tab. 8c. Apical vesicle distinct, trilobate. Sensilla S on ant. IV long and thin. Group d on ant. III with 5 chaetae. Chaetotaxy of head as in Tab. 8a and b, and Fig. 71. Tubercles Cl and Af separate (Fig. 71). Tubercle Af without non-reticulate area between chaetae A and B. Chaeta O absent (Fig. 71). Elementary tubercles DE and EE present. Tubercle Dl with 5 chaetae, chaeta Dl3 absent. Tubercle (L+So) with 10 chaetae, chaeta So2 as mi (Fig. 71). Chaeta A shorter than B.

Thorax, abdomen, legs. Body sensilla fine and smooth, shorter than nearby macrochaetae (Fig. 72). Chaetotaxy of th. and abd. as in Tab. 8d and in Fig. 72. Tubercles De on th. II with 4 chaetae. Chaetae De3 on abd. I-III shorter than De2. Furca rudimentary without microchaetae. Tubercle L on abd. IV with 7-8 chaetae. Chaeta L' on abd. V present. Reticulation on anal lobes absent or poorly developed. Cryptopygy well developed (Fig. 72). Abd. VI partially visible from dorsal side. Chaetotaxy of legs as in Tab. 7d. Femora I, II, III with 13, 12, 11 chaetae respectively. Claw without inner tooth.

Discussion. (see: Discussion of *D. weinerae*)

Distribution. DEHARVENG (1982a) redescribed the species based on Stach's material from the Chornohora range (Ukraine, Carpathians). Up to now it was recorded from Ukraine (Eastern Carpathians, KAPRUS' et al. 2007) and Poland (Western Carpathians, Tatra Mts., Pieniny Mts., as *Lathriopyga phlegrea* var. *plena*, STACH 1951, 1964, not confirmed recently). Unfortunately the material from the Polish localities has been lost (Prof. W. M. WEINER pers. comm.) and the present description and notes are based on the Ukrainian material only.

Ecological remarks. Its ecological preferences are not known precisely. In Ukraine it was found in mountain beech and spruce forests, exclusively in humid rooting wood and under bark of decaying logs. First instars have been collected in September only.

Deutonura phlegraea (CAROLI, 1912)

Achorutes phlegraeus CAROLI, 1912: 365

Deutonura phlegraea: DEHARVENG, 1982a: 10

Specimens found in Poland and recorded as *D. phlegrea* have been misdetermined and actually represent *D. albella*. In the light of these facts, this South European species (Italy, France, Portugal; DEHARVENG 1982a) should be removed from the list of Polish springtails.

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REFERENCES

- ARBEA J. I., JORDANA R. 1991. Tres nuevas especies de neanúridos en la Península Ibérica (Collembola, Poduromorpha, Neanuridae). *Graellsia*, **47**: 97-103.
- BABENKO A., FJELLBERG A. 2006. Collembola septentrionale. A catalogue of springtails of the Arctic regions. Moscow: KMK Scientific Press Ltd., 190 pp.
- BUȘMACHIU G., DEHARVENG L. 2008. Neanurinae and Morulininae of Moldova (Collembola: Neanuridae), with description of *Neanura moldavica* sp. nov. *Zootaxa*, **1714**: 61-66.
- CASSAGNAU P. 1979. Les Collemboles Neanuridae des Pays Dinaro-Balkaniques: leur intérêt phylogénétique et biogéographique. *Biologia Gallo-Hellenica*, **8**: 185-203.

- CASSAGNAU P. 1989. Les Collemboles Neanurinae; éléments pour une synthèse phylogénétique et biogéographique. [In:] R. Dallai (ed.). *3rd International Seminar on Apterygota, Siena*, 171-182.
- DALLAI R. 1983. Interesse biogeografico dei Neanuridi (Collembola) della Sardegna e delle isole dell' Arcipelago Toscano. *Lavori della Società Italiana di Biogeografia, (N.S.)*, **8**: 417-465.
- DÁNYI L., TRASER Gy., FIERA C., RADWAŃSKI J. M. 2006. Preliminary data on the Collembola fauna of the Maramureş (Romania). *Studia Universitatis Vasile Goldis, Seria St. Vietii*, **17**: 47-51.
- DEHARVENG L. 1982a. Contribution à l'étude des *Deutonura* du groupe *phlegraea* (Collembola: Neanuridae). *Travaux de Laboratoire d'Écobiologie des Arthropodes Edaphiques, Toulouse*, **3** (2): 1-20.
- DEHARVENG L. 1982b. Contribution à l'étude des Collemboles Neanurinae: évolution, spéciation, polymorphisme somatique et chromosomique des formes européennes. *PhD thesis, Université Paul Sabatier, Toulouse, France*, 284 pp.
- DEHARVENG L. 1983. Morphologie évolutive des Collemboles Neanurinae en particulier de la lignée neanurienne. *Travaux de Laboratoire d'Écobiologie des Arthropodes Edaphiques, Toulouse*, **4** (2): 1-63.
- DEHARVENG L. 1987. Collemboles cavernicoles VI. Une nouvelle espèce souterraine de Neanurinae: *Deutonura mirabilis* n. sp. d'Autriche. *Bulletin de la Société entomologique de France*, **91** (7-8): 209-211.
- DEHARVENG L., WEINER W. M. 1984. Collemboles de Corée du Nord III-Morulinae et Neanurinae. *Travaux de Laboratoire d'Écobiologie des Arthropodes Edaphiques, Toulouse*, **4**: 1-61.
- ECKERT R., PALISSA A. 1999. Beiträge zur Collembolenfauna von Höhlen der deutschen Mittelgebirge (Harz, Kyffhäuser, Thüringer Wald, Zittauer Gebirge) (Insecta: Collembola). *Beiträge zur Entomologie*, **49** (1): 211-255.
- GREENSLADE P., DEHARVENG L. 1990. Australian species of the genus *Australomura* (Collembola, Neanuridae). *Invertebrate Taxonomy*, **3**: 565-593.
- KAPRUS' I. J. 1998. The fauna of springtails (*Collembola*) from selected habitats in Roztocze. *Fragmenta Faunistica*, **41** (3): 15-28.
- KAPRUS' I. J., SHRUBOVYCH J. J., TARASHCHUK M. V. 2006. Catalogue of the Collembola and Protura of Ukraine. *National Academy of Sciences of Ukraine, State natural History Museum, Lviv*, 164 pp. [in Ukrainian].
- KOVÁČ Ľ. 1998. Chvostokosky (Hexapoda, Collembola) Ardovskej Jaskyne. *Natura Carpatica*, **39**: 95-102.
- KOVÁČ Ľ., KOSTÚROVÁ N., MIKLISOVÁ D. 2005. Comparison of collembolan assemblages (hexapoda, Collembola) of thermophilous oak woods and *Pinus nigra* plantations in the Slovak Karst (Slovakia). *Pedobiologia*, **49**: 29-40.
- LUCIÁÑEZ M. J., SIMÓN J. C. 1995. Dos nuevos taxones del género *Deutonura* (Collembola, Neanuridae) de la sierra de Gredos (Sistema Central). *Miscellanea Zoológica, Barcelona*, **18**: 89-97.
- SCHULZ H.-J. 1994. Cave Collembola from the Harz and Kyffhäuser Mountains (Germany). *Acta Zoologica Fennica*, **195**: 124-128.
- SKARŻYŃSKI D. 2003. Over 140 years of research on springtails (*Collembola*) of the Sudetes updated checklist, distribution, faunistic remarks and literature. *Szczeliniec, Wydawnictwo Parku narodowego Gór Stołowych*, **7**: 29-43.
- SKARŻYŃSKI D., SMOLIS A. 2006. Skoczogonki (*Collembola*) rezerwatu „Śrubita” w Beskidzie Żywieckim. *Parki Narodowe i Rezerваты Przyrody* **25** (2): 41-50. [in Polish with English summary].
- SKARŻYŃSKI D., POMORSKI R. J., SMOLIS A., WEINER W. M., SZEPTYCKI A., SŁAWSKA M., STERZYŃSKA M. 2002. A checklist of the Polish springtails (Insecta: Collembola). *Polskie Pismo Entomologiczne*, **71**: 23-42.
- SMOLIS A. Redescription of *Endonura dudichi* (LOKSA, 1967), *Endonura incolorata* (STACH, 1951), *Endonura lusatica* (DUNGER, 1966) and *Endonura tatricola* (STACH, 1951) (Collembola, Neanuridae, Neanurinae). *Zootaxa*, in press.
- SMOLIS A., SKARŻYŃSKI D. 2003. Springtails (*Collembola*) of the „Przełom Jasiołki” reserve in the Beskid Niski Mountains (Polish Carpathians). *Fragmenta faunistica*, **46**: 121-129.
- SMOLIS A., SKARŻYŃSKI D. 2006. Springtails (*Collembola*) of the „Barnowiec” reserve in the Beskid Sądecki Mountains (Polish Carpathians). *Proceedings of the State Natural History Museum, Lviv*, **22**: 69-77.
- STACH J. 1951. The apterygotan fauna of Poland in relation to the world-fauna of this group of insects. Family: Bilobidae. *Polska Akademia Umiejętności, Acta monographica Musei Historiae Naturalis, Kraków*, 97 pp.
- STACH J. 1964. Owady bezskrzydłe (Apterygota). *Katalog fauny Polski*, Vol. 15. M. Mroczkowski (ed.), PWN Warszawa, 103 pp. [in Polish].
- STERZYŃSKA M., KAPRUS' I. 2000. Owady bezskrzydłe (Apterygota). Skoczogonki (*Collembola*) Bieszczadzkiego Parku Narodowego i otuliny. *Monografie Bieszczadzkie*, **7**: 131-141.
- SZEPTYCKI A. 1967. Fauna of the springtails (*Collembola*) of the Ojców National Park in Poland. *Acta zoologica cracoviensia*, **12**: 219-280.
- TRASER Gy. 1999. Springtails of the Aggtelek National Park (Hexapoda: Collembola). [In:] S. MAHUNKA (ed.) – *The fauna of the Aggtelek National Park, I-II, HNHMBudapest*, 49-59.
- TRASER Gy., THIBAUD J. M., NAJT J. 1993. Deux nouvelles espèces de Collemboles (Insecta) de Hongrie. *Bonner zoologische Beiträge*, **44** (3-4): 221-224.
- WEINER W. M. 1981. *Collembola* of the Pieniny National Park in Poland. *Acta zoologica cracoviensia*, **25**: 417-500.